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The Pneumatic Tunnel under Broadway,

THAT wonderful metropolis of the Western continent, New York—the "Modern Babylon," as it is called by some European authors—offers within its limits samples of a diversity of means of transportation unparalleled in the whole world. Of street pavements alone there are many in stone, such as the cobble, Russ, Belgian, granite, etc.; then divers pavements in wood, asphaltum, and tar-concrete, of different kinds. Of railroads, there are the projecting T rail for steam-cars, and the grooved rail for horse-cars, while, independent of any pavements or railroads, numberless steamboats keep up the communications not only across the surrounding rivers, but also along the shores of the long and narrow island on which the city is situated. But the enormous daily tide of travel through the length of Manhattan island, for the accommodation of which the existing street pavements, railroads, and steamboats are utterly inadequate, and for which, in fact, the mere surface of the soil does not give sufficient unobstructed room, demands additional facilities of movement. Attention has lately been drawn to plans proposing to discard the surface altogether, and to move either above or underground, over or under all those temporary obstructions, which, in a city so thriving and populous, are of constant occurrence, and cause great loss of time to hundreds of thousands of passengers. It is, indeed, pleasant to contemplate the ease with which the cars of the Greenwich street elevated railroad daily pass along on their experimental trips, maintaining twice the velocity of the cars on the street, and unmindful of the "jams" by which the latter, and all other vehicles, as well as foot passengers, are detained in the mud below. The cars on this railroad are driven by stationary engines, placed at stations underground, with the intervention of wire ropes, continually running between the rails, and to which the cars can be attached at pleasure.

But a cheaper rope may be substituted, which never wears out, and which not only will pull like a wire rope, but also push like an inflexible bar—namely, a column of air in a tube, moved by a blower, which may either blow or press the air forward, or suck or exhaust, and thus, as it were, pull the air backward. This is the principle of the atmospheric railway. The first railway thus built had the air-tube between the rails, and a piston moving inside was by pressure or suction driven forward or backward, while a slot along the whole length of the tube, closed by elastic strips or valves, allowed a side-rod to project outward, to which the train of cars was attached.

An atmospheric pressure produced by suction can never fully reach fifteen pounds per square inch; this tube had to be of considerable size when any great power was to be communicated. It was hence found best to make the tube large enough to contain the body to be transported, by which arrangement the objectionable slot and elastic valve system could be abandoned. This modification is in operation in different parts of the world, under the name of the Pneumatic Dispatch system; and a charter was obtained some time ago from the Legislature of New York State to construct such a system in the city of New York.

The indefatigable managers of this enterprise conceived the idea of showing to the citizens of New York the advantages of building the tube so wide that a passenger railroad car could pass through it, as has been successfully done in London. For this purpose they have built a short section of a pneumatic underground railroad, by which, incidentally, another important advantage is obtained over surface and elevated railroads—namely, perfect protection against unpleasant states of the weather, this underground railroad being warm in winter, cool in summer, excluding all snow, rain, etc., and by the system of propulsion (a blast of air) securing perfect ventilation, very greatly needed in all other railroad tunnels.

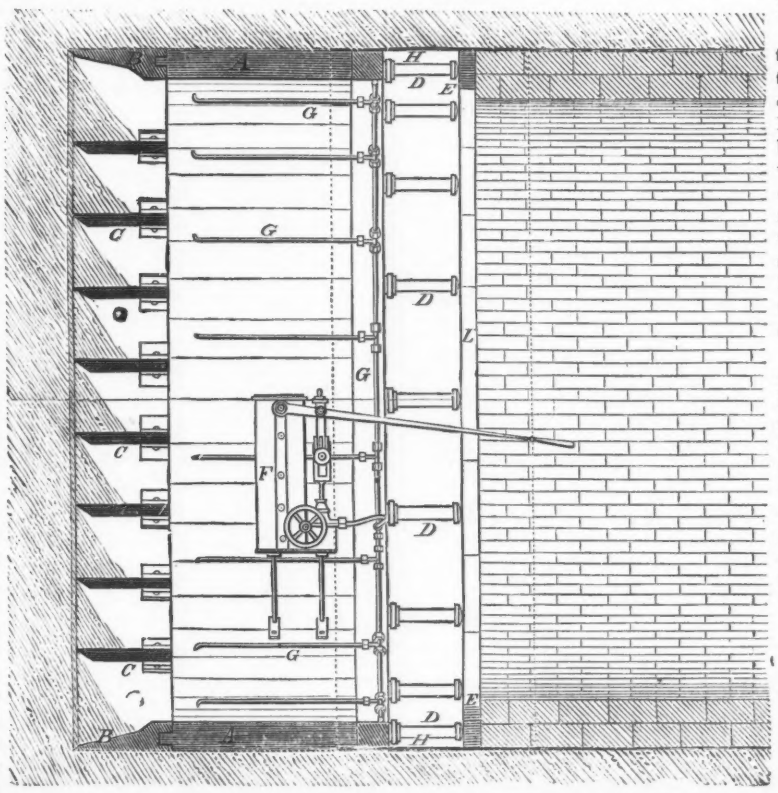

Fig. 1.—VERTICAL SECTION OF TUNNELLING APPARATUS.

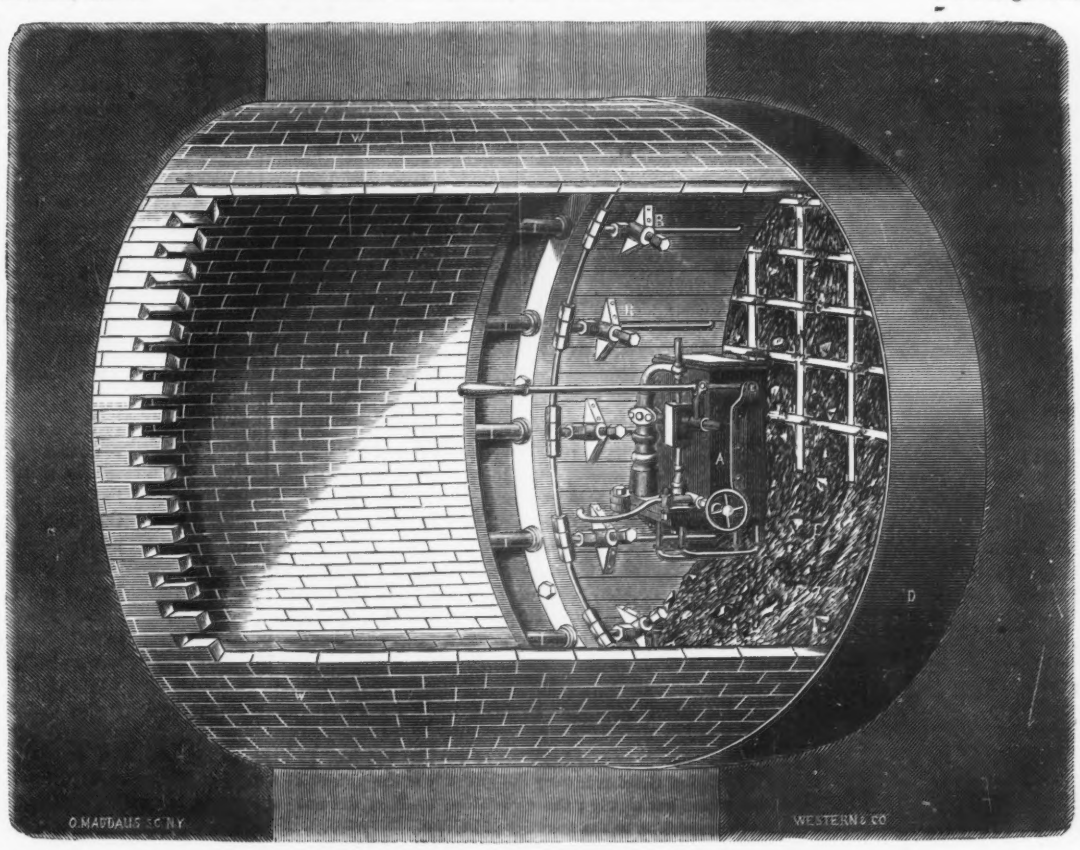

Fig. 2.—PERSPECTIVE VIEW OF THE TUNNELLING APPARATUS.

The blast of air is produced by a colossal machine, driven by a steam engine, which thus indirectly performs the function of any other engine, either locomotive or stationary, used in directly driving a train of cars. It is said to be able to displace 100,000 cubic feet of air per minute, and therefore will move the air through a tube of twelve feet diameter, or one hundred and twelve square feet sections, with a velocity of 100,000, divided by 112, or nearly nine hundred feet per minute, or more than ten miles per hour. It was made by Messrs. ROOTS, in Indiana, weighs fifty tons, and cost $20,000.

The tunnel, however, is the great feature of this enterprise; and the machine with which this tunnel is excavated after the style of a mole digging his hole, is the greatest curiosity of all. It digs not only under the surface of the street, but far below gas and water pipes and sewers, without disturbing any of them, nor the surface of the soil, and thus avoids all the objections made against the so-called Arcade system, by which the whole street and the foundations of all the houses on both sides would be disturbed. In this system, the travellers in the street and the dwellers in the houses scarcely know that anything is going on at all under the surface.

This most ingenious arrangement is the product of the skill and perseverance of four men, Messrs. A. E. BEACH, W. F. HOLSKE, E. LYON, and T. G. WATSON. The first conceived the original design; Mr. HOLSKE superintended the construction at the Holske Machine Company's works; while the hydraulic power driving the machine forward, and which is the most important engineering feature of the whole enterprise, was produced at the hydraulic engineering establishment of Mr. LYON, 470 Grand street, N. Y. This arrangement we will describe in detail.

The machine consists of a shield driven forward by hydraulic pumps. This shield consists of a large cylinder, open at both ends, with shelves arranged within the front end to receive the earth, and prevent it from falling too rapidly into the shield; at the rear of the latter, placed around its periphery, is a series of powerful hydraulic rams, eighteen in number, all connected with a single water-pump. From the rear of the shield, and passing entirely around it, extends a hoop or band of sheet steel, two feet wide and one-eighth of an inch thick, termed the hood. The brick tunnel is erected within this hood, which at all times covers the end of the masonry, and prevents the earth from falling upon the workmen. After a section of the tunnel sixteen inches long has been erected within the hood, the pump is operated, which causes the rams to slide out from the shield, and push with great force against the front edge of the tunnel, driving the shield forward into the soil. As the shield advances, the earth presses through between the shelves, and falls down upon the bottom of the shield, whence it is removed in barrows and cars. As soon as the shield has been advanced sixteen inches, its movement is stopped, and a new section of the masonry tunnel is erected within the hood. The shield is then again pushed forward, and so on. By means of this machine, tunnels of all kinds and sizes may be quickly constructed under the streets, without disturbing the travel of vehicles over the surface. The shield may be readily moved around curves or on grades. Where tunnelling at any considerable depth below the surface is required, the use of this machine saves a large amount of labor. Eight men working with two of these machines are enabled to excavate the earth and erect within the excavation eight running feet of completed tunnel per day. This shield was steered around the curve and down Broadway by turning the stop-cocks of water-pipes belonging to the hydraulic rams, thus changing the pressure from side to side as occasion re-

quired. During the progress of the work under Broadway, the exact course traveled by the shield was determined by the compass and survey in the usual manner, and the lines were from time to time verified by driving jointed rods of iron up through the roof of the tunnel to the pavement. This was done in the night-time after the stages had ceased running.

Our first figure represents a vertical section of this machine, in which A is the body of the shield; B, its cutting edge; C, the shelves on which the earth falls, to be shovelled away; D, the hydraulic rams; E, the bearing-blocks; F, the water-pump by which the water is forced into the rams D, which drive the shield forward; G, the pipes through which this water reaches the rams; and H, a hood which prevents the earth from falling before the bricks are inserted. The end of the brick tunnel, as far as completed, is represented at the right.

A perspective section is given in FIG. 2, in which D represents the shields or iron slug, with its cutting edge; C, the shelves, or partitions; E, the earth falling on them; A, the hand-pump, by which the water is driven into the jacks or rams L, by the intervention of the pipes and cocks B, which may be either all opened or partially shut, if the direction is intended to be changed, while the finished brickwork is represented at WW.

Our third figure represents a perspective view of the interior of the tunnel and its farthest extremity, with the men at work; the two on the left, at the hydraulic pump, advancing the shield, one on the right removing the earth as it drops on the shelves, and one in the centre of the foreground, wheeling a barrow with earth to the car ready to receive it, for transporting to the other extremity, at the entrance.

FIG. 4 represents a plan of the entrance of the tunnel as now on exhibition in this city. It is seen that by opening or closing large valves, or, rather, strong doors, placed in the proper position, the air can be easily forced into the tunnel, or taken out and discharged into the atmosphere. In the first case, as indicated by the arrows, the air will drive the car from the station down Broadway, as soon as it is moved out of the station-room into the tunnel proper, where it fits closely, though without contact. In order to get the car back again, the air-current is reversed in the manner indicated, the air driven out at the station, and admitted at the furthest end of the tunnel. The atmospheric pressure will then drive the car backward towards the first starting point.

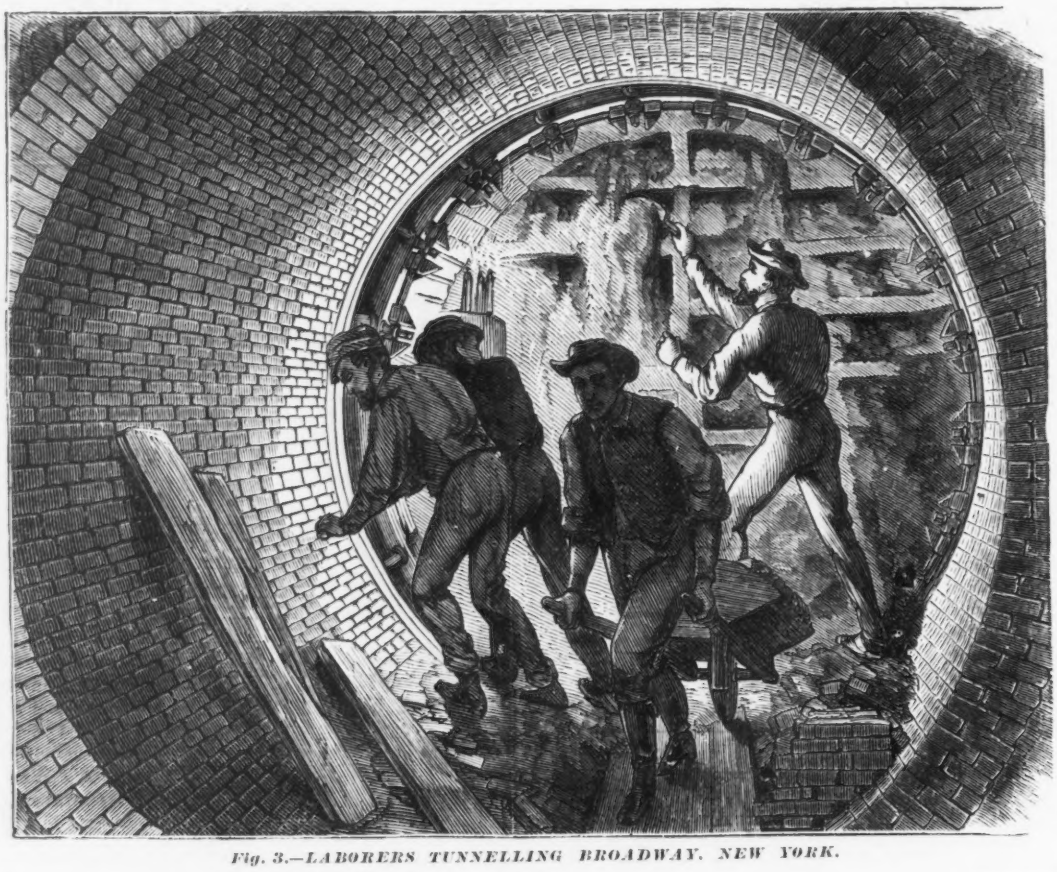

Fig. 3.—LABORERS TUNNELLING BROADWAY, NEW YORK.

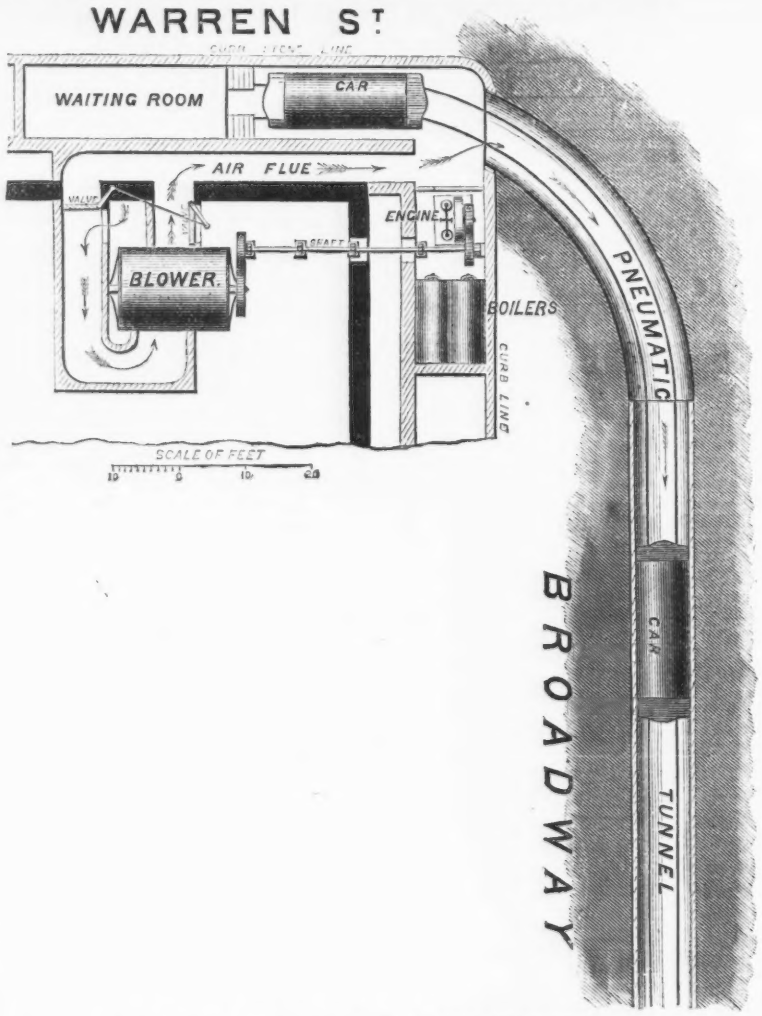

Fig. 4.—PLAN OF STATION AND ENTRANCE OF TUNNEL.

Gold.

GOLD, next to iron, is the most widely diffused metal upon the surface of our globe. It occurs in granite, and in all the rocks derived from it; it is also found in the veins which traverse other geological formations. It is much more common in alluvial grounds than among primitive and pyrogenous rocks. In the form of spangles it occurs in the silicious, argillaceous and ferruginous sands of certain plains and rivers, and especially at their junction. It is the only metal of a yellow color, and when crystallized always assumes one of the forms of the tesseral system, such as the cube or octahedron. It affords a resplendent polish, and may be exposed to the atmosphere for any length of time without suffering any change. It is remarkable for its beauty, is nineteen times heavier than water, and, next to platinum, the heaviest known substance. Its malleability is such that a cubic inch will cover thirty-five hundred square feet, and its ductility is such that a lump of the value of four hundred dollars could be drawn into a wire which would reach around the globe. It is first mentioned in Genesis, ii, 11, being found in the country of Havilah, where the rivers Euphrates and Tigris unite and discharge their waters into the Persian Gulf.

The relative value of gold and silver in the days of the patriarch Abraham was one to eight; at the period B. C. 1000 it was one to twelve; B. C. 500 it was one to thirteen; at the commencement of the Christian Era it was one to nine; A. D. 500 it was one to eighteen; A. D. 1100 it was one to eight; A. D. 1400 it was one to eleven; A. D. 1613 it was one to fifteen and a half; which latter ratio, with but slight variation, it has maintained to the present day. Gold was considered bullion in Palestine for a long period after silver had been current as money. The first mention of gold in the Bible as such is in David's reign, when that king purchased the threshing floor of Ornan for six hundred shekels of gold by weight. In the early period of Grecian history the quantity of the precious metals increased but slowly; the circulating medium did not increase in proportion to the quantity of bullion.

In the earliest days of Greece the precious metals existed in great abundance in the Levant. Cabul and Little Thibet (B. C. 500) were abundant in gold. It was obtained in considerable quantity in the island of Siphnos, and also from Mount Pangæus. It was an article of great rarity at that time in Italy, and only existed either in the form of ornaments or of offerings in temples. There was no gold plate in the possession of private persons, and no gold coin. It was also found in abundance in Turdeltania, in Spain. It seems to be a well ascertained fact that it was obtained near the surface, and countries which formerly yielded the metal in great abundance are now entirely destitute of it. Gold was also obtained by the Greeks from Asia Minor, the adjacent islands, which possessed it in abundance, and from India, Arabia, Armenia, Colchis and Troas. It was found mixed with the sands of Pactolus and other rivers.

Crœsus (B. C. 560) coined the golden *stator*, which contained one hundred and thirty-three grains of pure metal. Darius, son of Hystaspes (B. C. 538) coined *darics*, containing one hundred and twenty-one grains of pure metal, which were preferred for several ages throughout the East for their fineness. Next to the *darics* were some coins of the reigns of the tyrants of Sicily; of Gelo (B. C. 491); of Hiero (B. C. 478); and of Dionysius (B. C. 404). Specimens of the two former are still preserved in modern cabinets. *Darics* are supposed to be mentioned in the Old Testament under the name of *drams*. Very few specimens of the *daric* have come down to us; their scarcity may be accounted for by the fact that they were melted down under the type of Alexander. Gold coin was by no means abundant in Greece until Philip of Macedon had put the mines of Thrace into full operation, about B. C. 360. There are only about a dozen Greek coins in existence, three of which are in the British Museum; and of the latter two are *staters*, of the weight of one hundred and twenty-nine grains each. About B. C. 207, gold coins were first struck off at Rome, and were denominated *aurei*, four specimens of which are in the institution before alluded to. Their weight was one hundred and twenty-one grains each.

Gold coins were first issued in France by Clovis, A. D. 489. About the same time they were issued in Spain by Amalric, the Gothic king. In both countries they were called *trientes*. They were first issued in England in 1257, in the shape of a *penny*, of the value of twenty pence; only two specimens have come down to us. *Florins* were next issued in 1344, of the value of six shillings. The *noble* followed next, of the value of six shillings and eight pence; being stamped with a rose, it was called the *rose noble*. *Angels* of the same value as the latter were issued in 1465. The *royal* followed next, in 1466, of the value of ten shillings. Then came the *sovereign*, of twenty shillings, in 1489. The gold *crown*, of the value of ten shillings, followed, in 1527. *Unites* and *lions* were issued in 1603, and *exurgats* in 1634. The *guinea* was first issued in 1663, of Guinea gold. In 1733 all the gold coins (except the guinea) were called in, and forbidden to circulate. The present sovereign was first issued in 1817. The American *half eagle* was first issued in 1793.

From the earliest times to the commencement of the Christian era, the amount of gold obtained from the surface and bowels of the earth was fourteen hundred millions of dollars; from the date of the latter event to the discovery of America, thirty-nine hundred millions were obtained; thence to the close of 1842, twenty-eight hundred millions were obtained. The discovery and extensive working of the Russian mines added, to the close of 1852, six hundred millions. The discovery of the California mines in 1848, and the Australian mines in 1851, has added to the present time thirty-three hundred millions, making a grand total of twelve thousand millions of dollars. The average loss by abrasion of coins is estimated to be one-tenth of one per cent. per annum; and the loss by consumption in the arts, and destruction by fire and shipwreck, at from one to three millions per annum.

A cubic inch of gold is worth (at £3 17s. 10½d., or $18 69 per ounce) $210; a cubic foot, $362,808; a cubic yard, $9,797,760. The amount of gold in existence at the commencement of the Christian era is estimated to be four hundred and twenty-seven millions; at the period of the discovery of America, it had diminished to fifty-seven millions; after the occurrence of that event, it gradually increased, and in 1600 it attained to one hundred and five millions; in 1700, three hundred and fifty millions; in 1800, to eleven hundred and twenty-five millions; in 1843, two thousand millions; in 1853, to three thousand millions; and at the present time the amount of gold in existence is estimated to be six

thousand millions of dollars, which, welded into one mass, could be contained in a cube of twenty-six feet. Of the amount now in existence, four thousand millions are estimated to be in coin and bullion, one million in watches, and the remainder in jewelry, plate, etc.

The Russian gold mines were discovered in 1819, and extend over one-third of the circumference of the globe, upon the parallel of 55° north latitude. Their product, since their discovery to the present time, has amounted to one thousand millions of dollars. The first gold mine in the United States was discovered in Meadow Creek, Cabarras county, N. C., in 1799, by Conrad Reed. The California gold mines were discovered by William Marshall, on the 9th day of February, 1848, at Sutter's Mill, upon the American Fork, a tributary of the Sacramento, and extend from 34 to 49° of latitude. Their product since their discovery to the present time has amounted to fourteen hundred millions of dollars. The product of the Nova Scotia gold mines from 1860 to the present time has amounted to three and a half millions of dollars.

The Australia gold mines were discovered by Edward Hammond Hargraves, on the twelfth day of February, 1851, in the Bathurst and Wellington districts, and extend from thirty degrees to thirty-eight degrees south latitude. Their product, since their discovery to the present time, has amounted to eleven hundred millions of dollars. The finest gold was obtained at Ballarat, and the largest nugget yet obtained was dug up at Victoria, and weighed two thousand five hundred and sixty-eight ounces, valued at forty-eight thousand dollars. The New Zealand gold mines were discovered on the twentieth day of August, 1861, by Messrs. Hartley and Reilly, in the Octago district, watered by the Molyneux river, on the forty-fifth degree of south latitude. Their product to the present time has amounted to seventy-five millions of dollars. The annual product of gold at the commencement of the Christian Era is estimated at eight hundred thousand dollars; at the period of the discovery of America it had diminished to one hundred thousand; after the occurrence of that event it gradually increased, and in 1600 it attained to two millions; in 1700, to five millions; in 1800, to fifteen millions; in 1843, to thirty-four millions; in 1850, to eighty-eight millions; in 1853, to two hundred and thirty-six millions; but owing to the falling off of the California as well as the Australian mines, the product of the present year will not exceed one hundred and seventy millions.

Since 1792 to the present time, the gold coinage of the United States mint has amounted to nine hundred and forty-six millions of dollars, of which eight hundred and forty-four millions have been issued since 1850. The gold coinage of the French mint since 1726 has amounted to ten thousand eight hundred millions of francs, of which sixty-six hundred millions have been issued since 1850. The gold coinage of the British mint since 1603 has amounted to three hundred and twenty millions of pounds sterling, of which one hundred and fifteen millions have been issued since 1850. The gold coinage of the Russian mint since 1664 has amounted to six hundred and twenty-six millions of roubles, of which three hundred and sixty millions have been issued since 1850.

The sovereign of England contains one hundred and thirteen grains of pure metal; the new doubloon of Spain and the half-eagle of the United States, one hundred and sixty grains each; the gold lion of the Netherlands and the double-ounce of Sicily, one hundred and seventeen grains each; and the twenty-five franc piece of France one hundred and twelve grains. It has recently been proposed to adopt a uniform system of coinage throughout the world, so that the coins of one nation may circulate in any other without the expense of re-coinage—a consummation most devoutly to be wished. The fact that the large amount of gold which has been thrown into the monetary circulation of the world within the last twenty-one years, has exercised so little influence upon the money market or prices generally, is at variance with the predictions of financial writers upon both sides of the Atlantic. The increase in the present production of gold, compared with former periods, is enormous; and the price has not declined, although the annual product has increased four-fold within twenty-seven years.—*Charleston Chronicle.*

Polytechnic Club of the American Institute.

Meeting held at the Rooms of the Association, March 31, 1870, Professor S. D. Tillman in the Chair.

After the reading of the scientific miscellany, Mr. John. W. Sutton, of Oregon, presented a new rotary dynamometer. It consists of two discs connected by springs. One of these is fastened upon the shaft, the other is made fast to the pulley which takes the driving belt; this pulley is loose upon the shaft, and transmits the power through the connecting springs. A graduated scale with an index marks the number of foot-pounds, or, where the number of revolutions is known, the number of horse-power. Means are also provided for automatically recording the amount of work done, somewhat after the style of an indicator diagram. The instrument exhibited could be applied to shafting of almost any size, and was capable of measuring up to about fourteen horse-power. It is adjustible, and the instrument can be set at zero at any time, should the springs "let down." By removing a part of the springs, the instrument may be made very delicate, for testing the value of the lubricating oils.

Professor Van Der Weyde thought this was better than any instrument of the kind he had seen.

Mr. Sutton related some interesting experiments performed in California, where, with an unvarying load, the index went through a series of vibrations, thus—18-4-15 or 16-0. After some study, it was shown that this was the varying power of the engine at different parts of the stroke, the figures representing in horse-power the changes in one revolution. The engineer remarked that he always knew an engine showed more power in one stroke than another, but he never saw it before.

Dr. Richards wanted to know what the demand was for such an instrument.

Mr. Sutton said that this was the first instrument of the kind ever made in California. By its use at a fair in San Francisco he was able to sell a great many of the blowing engines for which he was agent—simply by the use of this machine, as it showed precisely how much power was used in driving them. He had had orders for some fourteen or fifteen of the dynamometers.

Dr. Van der Weyde said he thought their usefulness was not generally understood by those who have steam-power to let. Horse-power costs, in the very best engines, two and a half pounds of coal per hour; and if, in renting power, a man took more than he paid for, it was easy to see what a loss followed. The average engines would use four and a half pounds per hour, and it was of great importance that every man should know how much power was used, for if more was taken, more coal must go into the furnaces. The point was then illustrated by an incident where more power was rented than the engine could furnish, because there was no instrument to measure the power.

Mr. Montgomery said there was a great deal of rule-of-thumb in this question, of who has the best engines, and a great deal of ignorance as well. What we must know is, how much of steam is used, and how much power developed. In the renting of power sometimes an inch of belt was called a horse-power, and yet he knew a man who, with an inch and a half of belt, managed to transmit about fifteen horse-power, paying for only one and a half.

Mr. Sutton related an instance of a San Francisco engineer, who insisted that he had a twelve-horse engine, where the dynamometer showed it was only seven, to the man's great surprise.

Dr. Van der Weyde explained how the rules given for calculating horse-power were incorrect and could not be relied upon for showing the power of the engine. The exact pressure can only be determined by the indicator; rules cannot give it. It was remarked that Duncan, in England, introduced the heat of the condensing water as an element in the calculation of engine performance, and proves those engines leaving the water at the lowest temperature to be the most economical, since there was the least heat wasted.

Mr. Montgomery—Too much attention cannot be given to this point of the economy of engines, and this is especially true in our merchant marine. The indicator only tells us how much steam each engine uses, but the dynamometer shows just how much power this steam produces, and thus shows who builds the best engines. When Collins built the line of steamers that rendered his name famous, he asked Mr. M. who built the best engines. The answer was Penn & Co., of England (for, though they were Englishmen, they built a "bloody" good engine.) (Laughter.) They built an oscillating engine which saved in room and some forty per cent. in weight. But this was against the engineering opinion of the time, and so they put in the wrong engines cumbrous side-levers, and as a result we lost our merchant marine. If an indicator is used we know what machine uses the most steam and which one develops the most power from it, and this would work an entire revolution in engine building.

Dr. Van der Weyde—In relation to the "Baltic," one of the Collins steamers just mentioned, her engine was recently broken up, and the ship changed to a sailing vessel. Her engine was a good one, but too heavy; if it had not been, it would never have been broken up.

Mr. Sutton said there were few of our master mechanics who could take an indicator diagram properly; and as an illustration, told a story of a very peculiar diagram taken from an engine at the Mechanics' Fair in San Francisco, and how, after much overhauling of the engine, it was found that the indicator was not properly attached The indicator was a good thing in the hands of a master of the indicator and a master mechanic.

Mr. Wilcox read a paper on a steam boiler, of which a drawing was shown. It consisted of a series of lap-welded tubes, in an inclined position, above which was placed a cylinder containing water, say two cubic feet for each horse-power. The tubes were connected with the upper cylinder, so as to insure a free and constant circulation. Tubes, to be "staggered," would take up about two-thirds of the space of ordinary boilers.

Mr. Amory, of Boston, then read a description of the Amory furnace. Since the last meeting, he had found that the principle he used in his furnaces had been extensively applied in the smelting of ores in California, Nevada, Montana, etc. Fairburn and others, of equal reputation, have given certificates of a saving of fuel of thirty-seven per cent. over the best results before attained. A slow combustion is kept up in one chamber, from which the carbonic oxide is taken to another chamber, where, between reverberating plates, it meets with currents of hot air, when it is at once converted into carbonic acid, generating at the same time an intense heat. This is the chamber of quick combustion; from here the highly heated gases are conducted along the surfaces that are to absorb the heat. By this means all the combustible gases are burned, and none are left to take fire at the top of the chimney. In steamers the air may be taken from the deck, and the furnaces so arranged that the fires may burn well when the water was up to the grate bars—a great advantage in case of springing a leak at sea.

Mr. Montgomery, after alluding to some alleged improvements, said that we were travelling in a circle, the same things having been proposed years ago. He was in favor of Government inspectors who can tell us what are really improvements. Some of our old steamers used to do better work than those of to-day; and, as an instance, the steamer "La Fayette" was mentioned, which was, in the item of coal, much cheaper than the Clyde built ships now running. He reviewed the steam generator under consideration, and objected to the tubes being inclined, and thought that, to take the steam from the surfaces most rapidly, the tubes should be vertical. In inclined tubes, when the fire was driven too hard, the steam superheats, and drives the water from both ends.

Mr. Root said it made very little difference whether the tubes were vertical or inclined. In his opinion, vertical tubes burnt out faster than the inclined.

Mr. Montgomery objected to the use of brick-work around a boiler, each brick, in case of an explosion, becoming a missile of the worst kind, and the whole making a shower of grape-shot. He had argued the making of large sheets of boiler-iron to save joints and rivetting, which was an important feature.

Mr. Amory said, in regard to his furnace, that he had tested it before Mr. Wickstead, a gentleman of whom Mr. Lloyd, of the Admiralty, said that he was obtaining the highest results in economic combustion. When application was made to Mr. Lloyd to adopt it for the British Navy, he said if Mr. Amory could beat Mr. Wickstead, he would introduce his himself. After several trials, at which Mr. Wickstead seemed very much surprised, he was obliged to confess himself beaten, in one case, some twenty-two per cent., and in another, about twelve and a half; and he said he believed the average was about thirty-seven per cent. better than the average English practice. Mr. Lloyd then wanted it for the navy, and made the remark, as if to himself: "Vessels won't smoke, and they can't be seen more than six miles, but now the smoke can be seen fifteen miles." Mr. Amory refused to give it to the English Government, preferring to allow America the advantage of it; but our Admiralty officers thought such a saving not worth notice, and no attention was paid to it. In answer to a question, he said he had evaporated twelve pounds of water to the pound of coal. The meeting was well attended. The debates at times waxed somewhat warm, yet were, withal, very good-natured, and though somewhat protracted, proved highly interesting and instructive.

The Large Well in Prospect Park, Brooklyn.

In No. 26, Vol. VIII., of our Journal, we published a short description of this remarkable well. To-day we are enabled to present to our readers a full and interesting account of the method employed in sinking it, a description of the engine and pump used for raising the water into the reservoir, and a general discussion of all connected with this remarkable work of engineering. The whole is taken from the able report of C. C. Martin, Engineer-in-charge, to the superintendents of the Brooklyn Park improvements.

The method of sinking the well having been determined upon, the work was commenced as follows: An excavation about sixty feet in diameter was made to a depth of seven feet. Pieces of plank three feet long, ten inches wide, and two inches thick, were then laid upon this bottom at intervals of about three feet from centre to centre upon a circle of fifty-four feet in diameter, and the whole carefully levelled. A band of wrought iron fifty-four feet in diameter, half an inch thick, and twenty-two inches wide, was then obtained, and placed upon this ring of plank. The band was made of sheets about fourteen feet long, the ends of which were placed together, forming butt-joints; over these ran covering plates, three feet long, and double counter sunk rivets were used to secure them. These having been put in place, and brought to a true circle, a ring of oak timber, eleven inches thick, eleven inches wide on the top, and two inches wide at the bottom, was placed inside of the iron band, the thin edge resting on the short plank, and being in contact with the iron. This was securely fastened to the band by means of bolts and spikes. Upon this was laid another ring of oak timber six inches thick and twenty-four inches wide, the inner diameter of the ring being fifty feet. These two rings were securely fastened together by spikes ten inches long and half an inch square. Seven courses of oak of the same dimensions as the last were then laid up, making a total depth of timber of four feet, the whole securely spiked and bolted. The iron band reached to the top of the second six-inch course of timber, and the third course projected over its edge so as to come flush with the outside of the iron, thus forming a shoulder against which the iron could press, and which would prevent its being forced upon the outside of the curb. Forty holes were then bored through this four feet of timber, to receive the rods of one and one-half inch round iron which were sixteen feet long. These rods were passed through this mass of timber, and were held in position at the top by a turnplate. The wall of brick masonry, two feet thick, was then commenced upon this wooden curb, and carried up to a height of ten feet, where four layers of pine timber, each six inches thick and sixteen inches wide, were introduced. These were placed in the centre of the wall, and the iron rods passing through them were securely bolted down with heavy washers and nuts. The wall was now sixteen feet high, besides the cutting edge, which projected ten inches below the main wall, and was securely bolted together. While this was being done, a suitable derrick had been obtained, and so placed that the boom would swing over the wall, and command the interior space also. Iron buckets for hoisting out the sand, and a six-horse-power hoisting engine were procured. Work was then commenced upon the excavation. The material from within the wall was excavated, and thrown into the iron buckets, and was then hoisted out, and taken away. The excavation in the centre was kept below that at the sides, and when sufficiently advanced, the material from immediately under the wall was removed. This was done with considerable care and uniformity, and as the excavation progressed, the wall slowly and quietly settled down. This process was continually repeated until the wall was lowered forty-one feet, when frost suspended operations last season. At the same time that the excavation was going on within the well, the masons were at work carry

ing up the wall. The iron rods were extended within this wall to its top, but their size was reduced to one and one-fourth inches diameter. The brick wall had a battu towards the centre of half an inch per foot. The object of this was to prevent the wall from binding or getting wedged by the pressure of the earth. The result was as anticipated. The wall regularly and uniformly settled as the excavation was made.

The work was resumed last spring, and progressed satisfactorily until the bottom of the curb was about three feet below the water-surface, when it was found to be impossible to make the excavation under the curb uniformly. The curb did not settle evenly, and cracks were produced in the wall, also an unequal pressure from the material on the outside was thrown on the wall, which produced an eccentricity of about two feet in the diameter of the well. This wall was allowed to remain in the position last indicated. Another curb similarly constituted of timber, brick and iron, was constructed, the interior diameter being thirty-five feet, the walls two feet thick, and the height ten feet, besides the cutting edge, which is of wood, and projects below the main wall one foot. This curb or wall was lowered in a manner similar to the first, until its top was one foot below the surface of the water, giving a depth of twelve feet of water in the well. Work was suspended at this point, as the depth of water obtained was considered sufficient.

The method of making the excavation under water was somewhat novel, and entirely successful, reducing the expense of that portion of the work very materially. A cylinder twenty inches in diameter, and forty inches long, with a closed top, was made of three-eighths inch boiler iron. The whole was made air-tight except the bottom, which was left entirely open. In the top were two valves opening upward.

The lower edges of the cylinder were made thin and sharp. Attached to the top was a timber or stem six inches square, and eighteen feet long, and at the top of this a suitable attachment was made for a hoisting apparatus. The tackle of the derrick was made fast to this, and the cylinder was lowered away into the water, the valves were forced open, and the air escaped. As soon as the cylinder touched the bottom, the stem of the cylinder was worked backward and forward, thus forcing the cylinder into the sand by its own weight. When full of sand, the valves were closed, and the whole hoisted out. As soon as the cylinder was lifted above the water, it was swung to one side, the valves opened, and the contents discharged upon the platform constructed for the men to work upon. The cylinder has a capacity of seven cubic feet, and, on an average, five cubic feet of sand were lifted at each time, and a charge could be brought up every two minutes. The apparatus seemed to work as well in sixteen feet of water as in shallow depths.

The engine is of the kind known as the Worthington duplex pumping engine; and consists, essentially, of two direct acting horizontal engines, by the side of each other; so connected together, that the motion of the one will operate the steam valves and change the motion of the other. In the "Duplex" engine, the shock at the change of the stroke is avoided by the use of two double-acting water-cylinders and two sets of steam-cylinders; the whole so combined as to form one engine, delivering the water into a common air-chamber.

Each pump moves to the end of its stroke, and is there compelled to rest absolutely still for as much time as will allow the water-valves to seat themselves quietly, instead of sending them to their seats violently by a premature motion. And as this piston ceases its stroke, it communicates motion to the steam-valves of the other side of the engine, so that its pump assumes the work where the first laid it down, and continues it with such uniformity that the indicating gauge will show scarcely any variation in the water pressure. The work requires rest from motion while the valves are closing and the currents subsiding; but in the force main the upward flow must be unimpaired and unbroken.

When we examine the engine in regard to the quantity of metal in motion, we find no large masses moving, but that the power of the steam, acting direct upon the steam-piston, is transmitted through the piston-rod to the water-plunger, which is attached to the other end of the same rod, thus acting upon the water without the intervention of a greater mass of metal than the strains absolutely require. The engine being built so as to contain all these strains within itself, the foundations are smaller, and much less expensive, than those required for other classes of engines.

The capacity of the engine is such that it will easily deliver into the reservoir one million of gallons in twenty-four hours, through four hundred and sixty-five feet of twelve-inch pipe, at a height of one hundred and sixty feet. It is about twenty-five horse-power. It has two double-acting water-pistons; and each piston-rod passes through a high-pressure into a low-pressure cylinder, in which the steam is first used at high pressure and afterwards at low pressure. The steam cylinders are to be protected by a steam-jacket, and a covering of felt and black walnut, and are provided with balanced steam slide-valves. Steam water-pressure and vacuum gauges are attached to the engine, and there is also to be a counter to record the number of strokes.

There are four single-acting vertical air-pumps, worked by two half-beams. The engine draws the water from the well through a suction pipe, which delivers it into the water-cylinders. This suction pipe is fitted at its base with a "foot-valve," to keep it always full of water.

The diameter of the suction pipe is	12 inches.
" " " water-piston is	14 "
Length of stroke	17 "
Diameter of the two high-pressure cylinders	14 "
" " " low " " "	24 "

The speed of the engine is from fifty to eighty strokes per minute, as may be desired. The ordinary speed is about sixty strokes with the pressure of the steam forty pounds and the vacuum twenty-five inches.

The boiler is of the type known as the horizontal tubular. It is fifteen feet long, four feet in diameter, and contains thirty-nine tubes three inches in diameter. The grate surface has an area of sixteen square feet, and the heating surface of the boiler is seven hundred and fifty square feet. The furnaces are under the shells of the boiler; the fire returning through the tubes. The boiler fronts are entirely of iron, and are very substantial and neat in appearance. The boilers are fed by a small duplex pump.

The boiler-house is situated on the surface of the ground near the well, and is constructed of pressed brick, with Ohio stone trimmings. The chimney is located at one corner of the house; it is ten feet square at the base, and is to be sixty feet high, and has a flue two feet square throughout. The house is completed except the roof, and the chimney is carried up but about forty-five feet.

It was necessary to place the pumps and engine near the surface of the water in the well, and in order that they might be entirely independent of the walls of the well, which were liable to settlement, it was decided to place them on a platform carried by six cast-iron columns. These columns were made nine inches in diameter, with three-fourths inch thickness of metal, and of different lengths. They were cast with flanges on the outside, by which the sections were securely bolted together. A cap was made to fit the top of the column, and was securely bolted to it, and in the centre of this was a coupling for a two and a half inch hose. At the bottom another flange was cast, with a cone projecting ten inches from its under side, with an opening at the point two and a half inches in diameter. The column thus equipped was suspended over the position it was to occupy, and suitable guides provided to ensure its maintaining a vertical position in its descent. A hose was thus attached to the coupling on the cap, and connected with a small No. 4 Worthington pump. The pump was started, and water forced in at the top of the column and out at the bottom. As soon as the flow was fully established, the column was lowered down. The water escaping into the sand below the column loosened it, and kept it in violent agitation, so that it offered almost no resistance to the sinking, the water escaping alongside of the column to the surface.

These columns, nine inches in diameter, with a bottom flange eighteen inches in diameter, were sunk into the sand from eight to ten feet in about eighteen minutes, when the columns were at their proper depth. So long as the pumping continued, they were loose and easily moved around in the sand; but within three minutes after the pump stopped they were almost as firm as if set in stone, the sand having settled so compactly around them. The method was a complete success, and I see no reason why columns could not be sunk to almost any depth by the same process. Upon the tops of the columns were placed wrought-iron beams, carrying the floor and pumps. Stone steps were built spirally into the wall of the well, to enable visitors to reach the pump platform. A floor has been laid over the well, leaving a circular opening twenty feet in diameter. The floor is supported on two isometrical trusses. The entrance to the well is through the boiler-house and a six and a half feet side opening in the wall of the well.

The force main leading from the pump to the reservoir is a cast-iron pipe, twelve inches in the interior diameter. Its length is to be four hundred and sixty-five feet, and the elevation of the point at which it delivers the water into the reservoir, is one hundred and sixty feet above the level of the water in the well, and one hundred and seventy-three feet above tide level. The main was made with bell and spigot joints, the bells being five inches deep, and the lead joints were made only three and one-fourth inches deep, the balance of the space being filled by a hempen gasket.

The force main delivers the water into the reservoir just above its high-water line. The object in pumping to this height rather than into the bottom of the reservoir, is to insure a uniform pressure on the pumps. In the force main near the pump is placed a check-valve. This is a self-acting arrangement, by which the pressure of the water in the main is prevented from acting on the pumps while they are not in motion, and consists of an inclined partition across an enlargement of the pipe, with valves on the upper side, which are opened as the water is forced through them from the pumps, and which are closed by the pressure of the water in the pipe above them. At a distance of eighty-three feet from the well, and at an elevation of about sixty-one feet above the surface of the water in the well, there is a branch connecting with a fifteen-inch vitrified pipe, which leads to the lake near the proposed site of the refectory. This branch will be used when it is required simply to fill the lake.

At a distance of one hundred and fifty-four feet from the well, and at an elevation of ninety feet above the water in the well, is another branch connecting with a twelve-inch cast-iron pipe leading around the base of Look-out Hill to the uppermost of a series of pools. This pipe delivers the water at an elevation of one hundred and twenty-four feet, and will be used when a supply of water is to be furnished to the pools and cascades situated in the Ambergill and Nethermead districts.

It will thus be seen that the water from the well can be delivered at elevations of sixty-one, one hundred and twenty-four, or one hundred and sixty feet, as the case requires, thus reducing the work and cost of pumping to its minimum.

The water from the reservoir will be taken into the pipe distribution system to be used at the hydrants, drinking fountains, etc., at different points on the park. This will constitute but a small proportion of the water required on the park. By far the largest quantity will be required to supply the loss from the lake, due to evaporation from the surface and leakage from the bottom. This water may be used to produce pools, cascades, rapids, and running brooks, before it empties into the lake.

The ground on that portion of the park lying south of the hills, and in fact all of the south side of Long Island is one vast bed of sand, which is generally covered by but a few feet of soil and loam. On account of this peculiar formation, a large proportion, probably sixty per cent., of the rain fall is absorbed and passes down to what is popularly known as "the main spring." This is a body of water filling the sand, and extending under this whole district. The distance from the surface of the ground to the surface of this body of water depends upon the modulation of the ground; but the elevation of this water surface above tide level is quite uniform for equal distances from tide water, and depends upon that distance; it rises about seven feet per mile—so that, for instance, at any point two miles from tide-water the surface of this subterraneous reservoir will be about fourteen feet above tide level. The slope being known, it becomes an easy matter to calculate with great certainty the quantity of water which can be obtained from the well.

The rain fall averages something over forty inches per annum, but assuming it to be forty inches, then sixty per cent. of this, or twenty-four inches in depth of water, will reach the main spring. This quantity, over a circle with a radius of one half a mile, will give a daily supply of about nine hundred thousand gallons. To draw this supply of water to the well from the distance of one half a mile, it will be necessary to pump the water down to a depth of about three and a half feet, and this will allow the water to take the regular slope of about seven feet per mile. The water in the well is twelve feet deep, and can readily be pumped down seven feet, and this will draw water from nearly a mile in every direction. There is, therefore, an abundant supply of water within reach of the well, and the only remaining question was, could the requisite amount be pumped out without bringing in with it the sand in the bottom and around the well, and thus fill it up. This last question was set at rest by actual observation during a trial of the pump. It was found that when the water in the well was drawn down four and a half feet water came in at the rate of eight hundred and fifty thousand gallons per day, without in the least disturbing the sand in the bottom. This was on the third day the pump was run; and the rate of flow of the water towards the well will increase as pumping is continued, for the subterraneous channels will arrange themselves in directions towards the well. No doubt the bottom could be brought in, and the well ruined, by suddenly pumping the water down eight or ten feet; but if it were drawn down even to that depth gradually no damage would occur. The water must not be drawn down more than four and a half feet suddenly, as it cannot be done safely.

Table of Elements.

TO THE EDITOR—Sir: Having lately received some beautiful cabinets of all the elementary substances, it occurred to me that it would probably please your readers to see a new and the latest table of all hitherto-discovered elements, metallic and non-metallic, with the name of the discoverer, date of discovery, symbol, atomic weight, and specific gravity. I send herewith such a table, which you will please insert in your journal, if you have room for it. L. FEUCHTWANGER.

Table of all elementary substances hitherto discovered, with the name of discoverers, date, symbols, atomic weight, and specific gravity. By Dr. LEWIS FEUCHTWANGER.

Name.	*Discoverer.*	*Date.*	*Symbol*	*At. Wt.*	*Sp. Gr.*
Aluminium	Wœhler, Germany	1828	Al	27.4	2.6
Antimony	Basil Valentine	1450	Sb	122	6.7
Arsenic	Paracelsus knew it in XVI. century; George Brandt, Sweden	1733	As	75	3.7
Barium	Sir H. Davy, England	1808	Ba	137	
Bismuth	Agricola	1530	Bi	210	9.7
BORON	Sir H. Davy, England	1807	B	11	1.47
BROMINE	Ballard, France	1826	Br	80	5.54
Cadmium	Stromeyer	1817	Cd	112	8.6
Caesium	Bunsen	1861	Cs	133	
Calcium	Sir. H. Davy	1808	Ca	40	1.58
CARBON	Lavoisier es ablished the diamond as carbon	1775	C	12	3.5
Cerium	Hisinger, Sweden	1804	Ce	92	
CHLORINE	Scheele, Sweden	1774	Cl	35.5	.2454
Chromium	Vauquelin, France	1797	Cr	52 2	
Cobalt	Brandt, Sweden	1733	Co	58.7	7.7
Copper	known by the ancients	—	Cu	63.5	8.9
Didymium	Mosander	1843	D	95	
Erbium		—	E	112.6	
FLUORINE	Scheele investigated and discovered, but never separated it	—	F	19	1.069
Glucinum	Oxide by Vauquelin, 1797; metal by Wœhler	1828	Gl	9.3	
Gold	known by the ancients	—	Au	197	12.
HYDROGEN	as gas by Cavendish, England	1766	H	1	.69
Hydrogenium (metallic)	Graham	1869	H		1.708
Indium	Reich found in zinc ore	1861	In	35.91	
IODINE	Courtois, France	18 1	I	127	4.95
Iridium	Tenant	1803	Ir	198	
Iron	known from early time	—	Fe	56	7.79
Lanthanum	Mosander	1839	La	92	
Lead	known by the ancients	—	Pb	207	11.4
Lithium	Oxide by Arfredson, Sweden, 1818; metal by Brand	1820	Li	7	.59
Mercury	known to the ancients	—	Hg	200	13.5
Magnesium	Bussy, France	1829	Mg	24	1.74
Manganese	Gahn, Sweden	1774	Mn	55	7.
Molybdenum	Sheele, Sweden	1782	Mo	96	8.6
Nickel	Bergman, Sweden	1775	Ni	58.7	8.2
Niobium	Hatchett	—	Nb	94	
NITROGEN	Dr. Rutherford, Scotland	1772	N	14	.972
Osmium	Tenant	1803	Os	199.2	21.
OXYGEN	Dr. Priestly, England	1774	O	16	
Paliadium	Dr. Wollostat, England	1803	Pa	106.6	11.3
PHOSPHORUS	Brandt, Hamburg	1669	P	31	2.0
Pelopium	H. Rose	1846			
Platinum	Charles Wood, Jamaica	1741	Pt	197.5	21.
Potassium	Sir H. Davy, England	1807	K	39.1	.865
Rhodium	Dr. Wollaston, England	1804	Rh	104 4	11.
Rubidium	Bunsen	1861	Rb	85.4	
Ruthenium	Clauss	—	Ru	104.4	
SELENIUM	Berzelius, Sweden	1818	Se	79.5	4.3
Silver	known to the ancients	—	Ag	108	10.4
SILICON	Berzelius, Sweden	1824	Si	28	2.49
Sodium	Sir H. Davy	1807	Na	23	.15
Strontium	Sir H. Davy	1808	Sr	87.5	2.54
SULPHUR	natural product	—	S	32	2.0
Tantalium (Columbium)	Hatchett and Eckeberg, 1801; reduced by Berzelius	1824	Ta	182	
Tellurium	Klaproth, Berlin	1797	Te	128	6.2
Thallium	Crookes and Lamy	1861	Tl	203	
Thorium	Berzelius, Sweden	—	Th	1 5.7	
Tin	known by the ancients	—	Sn	118	7.29
Titanium	Vauquelin	1796	Ti	50	4.3
Tungsten	M.M. D'Elhuyard, Spain	1781	W	184	17.5
Uranium	Klproth, Berlin	1789	U	120	
Vanadium	Sefstrom, Berzelius, and Del Rio	1830	V	51.3	
Yttrium	Gadolin, Sweden	1794	Y	18.6	
Zinc	Henkel	1721	Zn	65.2	6.9
Zirconium	Berzelius, Sweden	1824	Zr	89.6	4.3

NOTE.—Non-metallic elements in SMALL CAPITALS; metals in ROMAN.

MINING SUMMARY.

California.

MARIPOSA ESTATE.

The *Alta California* of March 21, says: "The net earnings of the Mariposa estate last month were $16,050; as compared with $4 039 93 in February of last year, a gain of $12,010 17. There are now ninety stamps at work on the estate, and the managers are now putting up sixty more at the Ophir mills to run by water. The gross yield per day is nearly $1,000, and the cost of reduction is reported at the low figure of $1 per ton."

FROM THE SAN DIEGO MINES—RICH QUARTZ LEADS—THE PLACER MINES SUPERFICIAL—DESCRIPTION OF THE COUNTRY.

The San Diego *Union* of March 17, contains the annexed interesting mining news, received from a special correspondent:

"CUYMACA DISTRICT, March 10, 1870.

"It is from a region of snow and ice that your correspondent now writes. One week ago the sun shone brightly, and the breezes were balmy, but suddenly a 'change came over the spirit of our dream.' On Thursday a heavy wind prevailed all day, and at night came snow, sleet and rain. In the morning we found quite a respectable 'skimming' of ice over our water buckets, showing that Jack Frost had been a nocturnal visitant. Of course you want to know something about

"THE MINES.

"Well, I really think that I could sit down in your sanctum, and after 'interviewing' half a dozen returning prospectors, get you up a better account of the mines than I am now about to give you. The fact is that here the excitement is so intense that one scarcely knows whether he is on his head or heels. Imagine 800 men turned out loose in the mountains, with as little sense and as much 'friskyness' as so manny young horses. The people here are positively wild. Such a thing as sober thought is unknown. The rumor comes that Tom, Dick or Harry has 'struck it,' and forthwith the whole camp rushes pell-mell for the 'new diggings.' People don't sleep here at all. All night long the ferocious prospectors make the hills resound with their stories of the day's adventures. Talk of Babel. Let a fellow try camping out in the mountains hereabouts, and he will realize the force of the quotation, 'confusion worse confounded.' Of

"RECENT DISCOVERIES,

Perhaps the most important is that of the Hayden lead. This mine is considered by old quartz men to be as rich as the George Washington. It was discovered March 4th, by Paul Hayden, and the ledge has been opened in three different places. Mr. Hayden has located 1,000 feet for the company. Yesterday I saw some specimens taken from a hole four feet deep, which would certainly yield one dollar to the pound. The ore of all the newly-discovered ledges is similar in character to that of the George Washington. The 'casing' is of talcose slate, and this formation may be traced throughout the country.

"THE PLACER MINES.

"Mr. Hayden, previous to his discovery was engaged in placer mining with four others. They packed their dirt 300 yards to water, and averaged $2 50 per day to the hand. This is the best placer mining yet done here. The placer deposits are undoubtedly superficial, and will not keep 100 men employed for two weeks. This is my opinion, after an experience of nearly twenty years in placer mining. Very few persons here have made more than from $1 to $2 per day. The country does not bear the aspect of extensive placers. There is no heavy 'wash,' and the diggings are nowhere more than six to eight feet in depth.

"THE 'GOOD HOPE.'

Is the name of another location, made on the 7th in the Julian District. The ledge was discovered by Geo. W. Swain and Captain Miller. It is half a mile north of the George Washington. The rock taken out is very rich, specimens being thickly studded with gold. At the point where the ledge was opened the vein is two feet in width.

"OTHER DISCOVERIES

Are daily reported. Many very valuable ledges have undoubtedly been found, and I believe many more are yet to be discovered. This whole region is evidently rich in mineral deposits. It is a spur of the Sierra Nevada range, splitting off at Owens' Lake, one spur running southerly through the counties of Los Angeles, San Bernardino, and San Diego to the Peninsula of Lower California, and the other running southerly across Arizona into Mexico. Like the ranges above Owens' Lake, the slopes on the east are argentiferous, while those on the west are auriferous. It is in this western range that the recent gold discoveries have been made. Not more than 60 miles north of the Cuyamaca mountains, in San Bernardino county, are the gold deposites of Lytle creek, which have been worked for the past six years, and from which several hundred thousand dollars have been extracted. Running northerly, these gravel deposits continue almost uninterruptedly, terminating in what is known as the San Felicina District, in Santa Barbara county. The only quartz ledges worked are those of the Soledad District, in Los Angeles county, midway between San Feliciana and Lytle creek, which are paying well. San Feliciana is the point where gold was first discovered in California. At Lytle creek there are now hydraulic works, which are said to pay from $1,000 to $1,500 per day. But here, in San Diego county, quartz is our reliance; and it is the opinion of quartz miners of many years experience that nowhere in California has so much rich quartz been found distributed over so large a surface of country. A ledge that has not yet attracted special notice is that known as the Wetherby lead, at San Pasqual. It has been imperfectly worked and has yielded an average of $33 to the ton. It was abandoned two years since owing to the want of capital to pump the water out. This mine is on the western edge of the Cuyamaca District, and quartz lodes are traceable from this point to and beyond the Cuyamaca mountains.

"Intermediate between the Wetherby mine and the Cuyamaca district lie the Santa Maria placer mines, which have been worked at intervals during the past twelve years, yielding fair returns in the rainy seasons. The want of water during a great portion of the year prevents extensive operations.

"THE CUYAMACA DISTRICT

Possesses great value in view of its proximity to the harbor of San Diego. We are by the present wagon-road sixty miles from the bay, but this distance can be shortened by at least twenty miles, and if the present excitement holds it will not be long before a new road is opened. Indeed some of the farmers on the road are already at work upon a short cut. Here, too, we have an abundant timber supply, and water sufficient for the demands of a large community, and for all the wants of a quartz-mining district. The climate during the greater part of the year is delightful, and the soil in the neighboring valleys is very rich. I should mention, for the benefit of geologists, that the celebrated Temescal tin mines lie midway between Cuyamaca and Lytle Creek, in the same range of mountains.

"THE DAYS OF FORTY-NINE REVIVED.

"The flush times of California seem to be revived for a season here. As in days of yore, men sleep upon the ground and eat around their camp-fires. But few tents, comparatively speaking, have yet been put up. At 'Julian City' there are two log cabins and some twenty odd tents, and at 'Coleman City,' three miles west, there are a dozen tents. Probably eight hundred people are encamped in the Julian district, and about one hundred and fifty at Coleman City. A town site has been laid off on a flat near the 'Washington' mine, and the locators have gone to your city to sell lots. But in spite of the lack of habitations, men congregate in knots and talk excitedly over the 'prospects.' We have two 'saw-mills' in full blast, which are well patronized, and a grocery store is likewise doing a thriving business. People are flocking in daily from Los Angeles and Santa Bernardino counties, besides the throngs from San Diego, and we have now at the mines an aggregate population of not far from one thousand. There has been considerable suffering from the recent cold weather. The night of Thursday, March 10th, was really terrible. A very large proportion of the people were without shelter, and the driving storm came upon them with full force. On the whole, after having traveled over this country for two weeks, and after having prospected and talked with old prospectors, I believe that I am warranted in saying that no richer quartz district than this has yet been opened in California. Here is a field wherein the capitalists of the great cities may operate with profit, and the city of San Diego will surely be richly benefitted by the working of these mines."

FURTHER INTELLIGENCE—THE PROSPECTS ENCOURAGING AND THE MINERS HOPEFUL.

The following, from a letter by a prominent San Diego merchant to a merchant in an Francisco, gives some interesting facts and rumors concerning the new mines. The letter is dated March 13th: "There is no cessation of good reports from the mines. I saw a letter two days ago from a partner in one of our heaviest firms here, to his brother, stating that he had 'struck it rich' in another location a short distance from the 'George Washington' ledge, which he thought was richer. The latter closed by saying 'there is plenty of gold here.' William Roberts, a thoroughly reliable citizen, has just returned. He says he has located a placer claim, which he thoroughly prospected, and is satisfied it will pay $10 to $15 per day to the hand. He also located a quartz claim, which he thinks is better than the 'George Washington.' Another wagon load of quartz came in yesterday. It is all so exceedingly rich that I conclude, 'on general principles,' it cannot be extensive. And though all reports agree as to the quality and extent, I can't help thinking that the gold blinds their judgment. I am afraid it is only some pockets that they have struck. None of the miners have sunk over three or four feet on their ledges, though discovered and located two weeks ago. Still, even if they are pockets, there are several thousand tons in sight of rock worth four or five thousand dollars per ton, which will count up in the millions alone, even if they 'peter out.' So you see, looking at it in the worst view, we have a 'big thing.' Unquestionably there are China diggings enough to support for a long time hundreds, perhaps a thousand Chinamen, though I think water will be found scarce in summer. One man, who has prospected a good deal, says there is one mountain side that has a good prospect from the roots of the grass to some eight feet deep—which was as deep as he went, though he did not then strike the bed-rock. He thinks there is water enough to sluice it, and that it would yield $15 per day to the hand, and perhaps more. I see the Los Angeles telegrams say the nearest route to the mines is through that city. Now the facts are these: The mines are situated exactly north-east from San Diego—38 miles in air line; and by a new road, which is now being opened, about 45 miles. From Wilmington to the mines the distance is 145 miles by the nearest route; and by way of Los Angeles it is 163 miles."

RICH MINING DISTRICT IN YUBA COUNTY.

The Nevada *Transcript* of March 24th has the following: "Sucker Flat is a rich mining district, and is located just beyond the Nevada line, in Yuba county. For the magnitude of its mining operations it equals any, while in the yield of its mines it probably exceeds any district yet developed in the State. The leading mine is the Smartsville Consolidated Hydraulic Mining Company's claims, which, from its name, has been spoken of as being located at Smartsville. This mine has an outlet on the Yuba, is just over the ridge from Mooney Flat, and about half of the ground is located in Nevada and half in Yuba county. It is being worked on a large scale. The banks are one hundred feet in depth, and they have the blue gravel channel. The claim may be considered as a new development, as only two full runs have been made. In December, after the first run, the yield was $11,000, and the last run, of thirty days, gave a gross yield of $70,000. The claim is now thoroughly opened, and will be worked without interruption. They have ground enough to last for twenty years."

FROZEN GIANT POWDER.

The Alpine *Miner* of the 19th inst. says: "Frozen giant powder will not do to fool with, as was plainly illustrated last week by Mr. McCuen, of Silver Mountain. Finding the powder more compact in the box than usual, he went to work digging it up, when it took fire and burned so rapidly that his house was entirely consumed. This changing the nature of giant by freezing is now considered the greatest objection to it, and we hope some remedy may be found therefor. In the meantime, let those who have anything to do with this powder be very careful to place it where it will gradually thaw out and become loose and soft before using or handling. Do not try to use it in the congealed state, or even handle it, except with great care."

Michigan.

LAKE SUPERIOR COPPER TRADE.

We compile the following from the Portage Lake *Mining Gazette's* (February 17) detailed annual review. The following is the copper product, district by district:

	No. of Mines.	Tons.	1868.
Portage Lake District	15	11,730	.....
Keweenaw District	7	2,656	.....
Ontonagon District	12	901	.....
Total	34	15,287	13,048
Increase		2,239	

The ingot copper produced amounted to 12,200 tons, valued at $5,368,000, compared with 9,985 tons in 1868, worth $4,592,000. The total gross product since 1845 has been 128,275 tons; the total of ingot copper, 99,448 tons, valued at $56,661,000. The business of 1869 has required assessments on the stock of eight companies of from fifteen cents to $2 per share—the sum thus raised being $176,000. Since 1845, 110 companies have paid in assessments (from $2,000 "Sharon" to $910,000 "Isle Royale," each), $16,616,500. Among those requiring greatest outlay have been the Albany and Boston (conglomerate), $615,000; Amygdaloid, $470,000; Copper Falls, $510,000; Hancock, $530,000; Hecla, $500,000; Huron, $560,000; Isle Royale, $910,000; Minnesota, $436,000; Pennsylvania, $500,000; Phœnix, $760,000; Shelden and Columbian, $460,000; South Pewabic, $500,000; Toltec, $420,000. These mines have paid an aggregate of $300,000 dividends from the earnings of 1869—an excess of $124,000 over the amount of assessments on other companies. The total of dividends declared from the beginning—nine mines—has been $6,370,000. The total proceeds—sales of copper and assessments has been thus, $73,307,500—$66,837,5 0 in excess of dividends. The percentage of dividends to total proceeds has been 8.07; of dividends to copper sales, 11 24; and of dividends to assessments, 38.26. The gross tons of iron ore shipped from thirteen mines amounted to 643,238, compared with 493,200 in 1868—an increase of 149,948 tons The total pig iron product—ten mines—was 38,504 tons, against 36,425 tons in 1868, an increase of 2,079 tons. The total product since 1856 has been: Ore, 2,912,224 tons; pig, 191,312; valued at $22,460,005.

Montana.

THE MINES OF CEDAR CREEK.

The *New North West* has from Mr. W. J. McCormick of Misoula, and recently from these newly discovered mines, the following items of news: "When he left only one set of sluices were set in the gulch These were Jim Lore's, who is running a drift on the bar on which Louisville is built. It was reported that in two days, from eight set of timbers, he cleaned up $300, and that the ground had prospected one dollar to the pan. No. 60 below is the lowest claim yet opened to bed-rock. At No. 62 above, there was five feet of snow. No. 21 below, prospects from five to fifty cents in the gravel; and No. 58 below—Joe Carroll & Co.'s—from three to fifteen cents in the gravel. Mr. McCormick has $4 50 which he panned himself from five pans of dirt from No. 54 above and No. 21 below. It is the handsomest gold we have seen, and will assay close up to .970. The bars, hitherto thought to be of little consequence, are now attracting earnest attention. They contain excellent beds of gravel and prospect well up to 150 feet above the creek level. The abundance of water in the gulch, and the heavy grade facilitates hydraulicing, and these, if they prove good, will give permanency to the camp. A. J. Simmons and Jack Allport purchased a bar claim opposite creek claim No. 88 below, for $250 the other day. It has prospected as high as $3. A great deal of prospecting is now going on in the neighboring country. Among others in a gulch emptying four miles below Cedar; in Trout creek, five miles above Cedar; in Dead Horse gulch, putting in on the north side from a range between the Missoula and Pen d'Oreille and emptying eight or ten miles above Cedar; and in another gulch three or four miles above Trout creek. When Mr. McCormick left, a big stampede was in progress to one or more of these gulches, but which he was uninformed. There are ten or twelve gulches, all having their sources near the same locality as Cedar. Moose creek and St. Joe have been opened partially, and it is believed good mines will be found in them. Mr. McCormick says Cedar only yields the palm to Alder for the richest camp ever struck in Montana, and he believes that Missoula county will have the largest population of any county in Montana in eight months from date."

Nevada.

FROM HUMBOLDT COUNTY.

The following news items were taken from the Humboldt *Register* of March 26: "A movement is in progress of incubation to have a good wagon-road constructed from Unionville to the Central Pacific Railroad at or near the Rye Patch station. The proposed road is to bring Unionville within eight miles of the railroad, instead of twenty, the distance now traveled by stage to Mill City. The road can be built at a cost not to exceed $1,500. The Pioneer mill started up last week, since which time it has been running to its full capacity on Manitowoc ore. Owing to the almost impassable condition of the roads between the Arizona mine and the mills, the working force has been greatly reduced for the past six weeks. About the first of April, however, we understand that the force of miners will be largely increased, and work prosecuted extensively during the coming summer. The yield of this ledge for the past twelve months is roughly estimated at $500,000, and should it continue to honor the drafts that will be made upon it, the yield for the next twelve months will not be less than $1,000,000. Work is to be resumed on the Seminole tunnel about the first of the month. Mr. Wiley, just in from Pueblo District, reports everything quiet in that locality. Says there are plenty of rich copper ledges in the district, but are too far from the railroad—they won't pay at present. Thinks he will abandon the district and locate in Winnemucca. Eight attachment suits were brought this week against the Star City Mill and Mining company."

Idaho.

The Owyhee *Avalanche* says: "Wells, Fargo & Co. shipped from Owyhee during the year 1869, $835,181 07 worth of bullion, coin value. The total product of our mines for 1869 may safely be put down at a million dollars in coin, as the aggregate carried away in private hands would easily bring it up to that amount."

Canada.

OIL MATTERS AT PETROLIA.

A correspondent of the Toronto *Monetary Times*, writing from Petrolia, March 31, says: "Oil matters are very brisk here, with a continuous demand for crude. The production of last week was not so great as the week before, owing to many wells being shut down for repairs. The Lawson & Vivian well, on lot 12, 12th concession, is a very fine one, but has not yet been thoroughly tested. The McDougal well, to the west, is also rather increasing; the yield, on the average, is something over thirty barrels per day. Great preparations are being made for the sinking of a number of new wells in the spring (some twenty in all). The daily shipment of oil and its products are about the same (twenty-three car loads), but there is great loss of time in shipping by the broad guage. which is seriously felt by shippers, who are talking of petitioning the Great Western Railway to construct a narrow guage on the Sarnia branch. The export firms are doing a flourishing business, and running their full capacity. Business here is very brisk, and there is not a house to be had for love or money. Lands are looking up, and several small sales were made to actual operators. From 1,000 to 2,000 barrels of crude changed hands at rates varying from $1 62½ to $1 80 per barrel, the latter figure being for extra. Fresh-pumped crude $1 62½ to $1 80 per barrel; tanked, $2 to $2 25; refined, 21c. to 23c. per gallon. The quantity of oil now in tank at Petrolia is estimated by the Wyoming *News Letter* at 283,200 barrels. From this must be deducted losses for shrinkage, water, and so forth, which are variously calculated at from five to ten per cent., according to the quality of the oil. The parties who have the oil now tanked are: Iron Tanks, 20,000 barrels; Higgins & Bro., 28,000; Lancey (underground), 50,000; Elwood & Parsons, 27,000; North Eastern Co., 2,400; Van Tuyl, 7,000; Case, 2,000; Blackburn & Co., 4,200; Hillsdale (Blackmar), 16,000; Lincoln Co., 12,000; Norris (St. Catharines), 6,000; H. Prince, 6,000; Fairbank, 18,000; Baxter, 9,000; Eddy & Co. (Parnia), 1,000; Marshall & Goodrich, 8,000; S. B. Hill, 11,000; Simpson, 1,000; W. Lindsay, 700; Standard Refinery, 24,000; O. Simmons, 1,500; A. Craise, 900; E. Coryell, 2,000; Crescent Co., 2,500."

MARKET REVIEW.

The Coal Trade.

NEW YORK, April 8, 1870.

The present week brings a general feeling of hesitation in the coal trade. On Saturday last, according to their previously declared intention, the operators of Schuylkill county suspended operations, in consequence of the refusal of the men to work upon the basis of $2 50, and the issue is now joined between the operators and men on the question of wages. In other words, Schuylkill miners propose to dictate to capital what it shall pay for labor performed, and what the price of coal shall be. As we have intimated in a former article, this issue has taken place at a peculiarly unfortunate time for the men; they are demanding an increase in wages while everything else is gradually coming down. The operators have power to resist what is a really unjust demand. Schuylkill is now fighting a battle that ought to be final in this contest. Should the men succeed, and the advance in prices induce the operators to resume work, the whole question is unsettled, and we shall be just where we were when the contest first began. We fully appreciate the difficulties of the case, as Schuylkill has some 150 operators scattered over a large extent of country, which renders it very difficult to secure the concert in action which is absolutely indispensable to secure success in such a contest. Heretofore the operators have always failed, each time yielding; let this not be the case this time, but stand firm to your colors. The general opinion of the trade here seems to be that, like other efforts of the kind, this will be a failure. If work be resumed by the first of May, it is probable that prices would be sustained for a short time only, and in a few weeks over-production would set us all at variance again, knocking prices down and compelling a suspension.

The amount of coal on hand in this market is very small, and circular prices are well sustained, and the demand is good. Last week we note the Pennsylvania and Reading Railroad brought the largest coal tonnage to market which we have ever noted.

The shipments, however, for the present week are exceeding light, the reason for the increase was probably in the desire to get as large an amount as possible to tide-water to take advantage of the advance in prices.

In partial explanation of the small shipments at the present time from other regions, we have the snow and rains, which in some mines have stopped production or greatly hindered it. The Lehigh Exchange have made new prices to-day: lump, broken, egg, and chestnut, $6 25; stove, $6 75, alongside. At Mauch Chunk, $3 50 and $4. Expenses to New York are $2 50 and 25 cents for unloading. We quote the canal expenses from Mauch Chunk to New York as follows: Lehigh Canal, 40 cents; Delaware Division, 30 cents; Delaware and Raritan, 35 cents; freight $1 25; towing from New Brunswick 20 cents, making $2 50 in all. The Morris Canal have fixed tolls at $2 50.

A break is reported in the Delaware Division Canal, which may interfere with shipments. The Lehigh Canal is open, but as yet the shipments have not been large. Our advice then is to buy coal as it is wanted; there is too much uncertainty to render any other course safe.

RETAIL.—There is a fair demand, and we quote Pittston coal at $6 to $6 50; Lehigh, $7 to $7 50.

GAS COALS.

The demand is active, though former prices are unchanged. At this season of the year gas companies are making their contracts, and probably more gas coal has been sold within the last two weeks than will be disposed of in the remainder of the year.

BITUMINOUS COALS.

We would take the present time to urge the merits of the bituminous coals both for steam and manufacturing purposes, and in view of the troubles likely to continue in the anthracite market, to advise their adoption wherever it can be done. Their value for steam-making is very great, being much above that of anthracite, while their prices can be calculated upon with some degree of certainty, an item of no small importance to the consumer.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending April 2, 1870, compared with week ending April 3, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R	4,138	696.531	14,189	746,565
Schuylkill Canal	15,572	59,706	6,226	7,866
Lehigh Valley R. R., N			4,958	75,071
" " S	42,729	666,691	60,884	825, 41
Lehigh and Sus. R. R.	26,573	234,300	33,988	244,5.3
Lehigh Canal				
Scranton North	10,708	128,636	14,173	155,484
" South	34,777	3-4,789	3-,982	4?9,04
Penn. Coal Co., rail	18,468	176,068	21,935	229,239
" " canal				
Del. and Hud. C., rail, N.			12,512	145,858
" " " south			11,2 3	59,643
Shamokin	3,869	79,731	6,120	67,733
Trevorton	125	5,035	1,956	65,256
Lykens Valley Coal Co.	1,102	10,925		
Wyoming South				
" North				
P. N. Y. C. & R. R. Co.			4,959	75,549
Williamstown Coal'y	2 082	32,015	6,005	56,849
Short Mountain	2,1 9	1-,210		
Total	159,800	2,467,697	327,160	3,163,720
1870			159,8.0	2 467 697
Increase week and year			168,260	696,033

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending April 2, 1870, compared with week ending April 3, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.				
C. & O. Canal				
H. & B. T. R. R.	5,764	74,650	6,711	58,731
Harrisburg & D.			11,460	124,145
L. V. R. R.				4,292
P. & N.Y. C. & R. Co.			3,787	52,617

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending March 31, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	94,199 02
Previously this year	65 .36 17
Total	746,565 19
Same time last year	696,.61 00
Increase	50,004 19
Amount sent same week 1869	4,536 00

Report of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, March 31, 1870:

From St. Clair	37,402 17
" Port Carbon	6,897 03
" Pottsville	1,9.4 05
" Schuylkill Haven	28,112 18
" Auburn	4,000 10
" Port Clinton	15,6.8 05
" Allentown and Alburtis	303 00
" Harrisburgh and Dauphin	11,459 19
Total paying freight	105,660 01
Coal for Company's use	4,.86 14
Total for week	110,046 15
To same time last year	8 3 7.8 38
Total	913,845 03
To same time last year	8.8,670 14

Report of coal transported over the Schuylkill Canal for the week ending Thursday, March 31, 1870.

	Tons. Cwt.
From Port Carbon	2,211 00
" Pottsville	
" Schuylkill Haven	4,015 02
" Port Clinton	
Total for week	6,226 02
Previously this year	1,640 11
Total	7,.66 13
To same time last year	39,706 10

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending March 31, 1870:

	Tons.
For week	11,460 19
Previously this year	113,145 14
Total	124,.06 13

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, April 2, 1870.

	WEEK.	SEASON.
North	4?,086 14	539,768 12
South	11,263 01	59,.43 02
Total	6 ,349 15	59 ,4.1 14
Corresponding time in 1869.		
North	40,5 2 10	4?5, 9 0?
South	7,480 10	21,147 01
Total	43.003 00	476,439 10
Increase North	8,564 04	Increase 8?.476 03
Increase South	8.782 11	Increase 38,496 01
Total Increase	17,346 15	Increase 122,972 04

Report of Coal Transported over Lehigh and Susquehanna Railroad.

Week ending April 2, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1?69 tons ct	YEAR, 1?70. tons cwt.	YEAR, 1?69. tons cwt.
Wyoming Region	2451 19	1?476 13	196?33 01	1?2925 05
Upper Lehigh Region	3?54 19	2?99 00	14885 1?	39?0? 16
Hazleton Region	202 ?8	2?96 14	?2.46 09	4?20 00
Beaver Meadow Region	378 07	1?40 18	378 07	1.40 18
Mauch Chunk Region		0?60 0	30089 18	55?35 14
Totals	33?88 03	26?73 1?	244533 07	234300 03
Increase	?414 13		10.?3 04	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	25?11 11	16?96 09	20?984 04	204205 16
Forwarded East of Mch Chunk by Canal	?48 11	?318 02	?48 11	?318 02
Delivered at and above Mauch Chunk	1?26 16	?49 02	?514 08	?996 15
Delivered to L. & B. R. R. at Plymouth Bridge	?541 15	1?84 02	26?86 04	?9?5 14
L. V. R. R. at Sugar N.		25 15		49.3 16
Totals	33?88 03	26?73 1?	244533 07	234300 03
Of the above there was from Mines controlled by Co., W.B.C. & L.Co	19?26 04	?092 0?	73?96 01	65139 19
L. C. & N. Co	1?36 11	?060 05	41. 00 17	15?05 04
	11992 15	13?52 06	115436 18	120745 03
Increase	1?59 11		5308 05	
Decrease				

Report of Coal Transported over Lehigh Valley Railroad

For the week ending April 2, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVI'S Y. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	12,877 02	175,190 11	188,067 13
" Hazleton	38, 82 11	429,121 02	467,503 13
" Upper Lehigh	873 04	?77 16	1,651 00
" Beaver Meadow	15,?93 11	139,?02 17	154,8?6 08
" Mahanoy	7,416 19	80,3.9 00	87,745 19
" Mauch Chunk		447 17	447 17
Total Anthracite	74,843 07	825,469 03	900,312 10
Bituminous Coal rec'd from Cata. R.R.			
N. C. R R			
E. P. R. R			
P. & N.Y C. & R.R. Co		4,292 00	4,292 00
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	74,843 07	829,761 03	904,604 10
Same time last year	48,1?4 00	6 9 006 03	7?,110 03
Increase	26,?59 07	170,755 00	197,494 07
Decrease			
Forwarded East from M'h Chunk by rail	67,274 11	729,626 00	796,900 11
Same time last year	47,729 09	623,962 01	668,691 10
Increase	24,5?5 02	105,663 19	130,209 01
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	67,274 11	729,626 00	796,900 11
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	4,958 15	70,112 07	75,071 02
To L. & S. R. R. at Packerton for rail	156 03	2,5?6 17	2,?53 00
Delivered at M'h Chunk	?1 18	418 03	440 01
Delivered on line of road above Mauch Chunk	372 17	5,117 07	5,490 04
Delivered above M. Chunk for use of L. V. R.R.	1,?00 00	16,828 00	18,028 00
To L. & S. R.R., at P'n Hav., for railroad			
Do for canal			
At M.Chunk for canal	859 03	655 09	1,514 12
Total Anthracite	74,843 07	825,469 03	900,312 10
Bituminous Coal		4,?92 00	4,292 00
Total all kinds	74,843 07	829,761 03	904,604 10

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending April 2, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	4,958 15	?6,560 12	?5,?49 07
Bituminous	3 ?87 00	42,830 00	5?,617 00
Total, Ant. and Bit	8,745 15	119,420 12	128,166 07

Freights.—APRIL, 1870.

TO EASTERN PORTS.	From Philada.	From E. Port and Port Johnston.	From Newburg	From Rondout
Amesbury	$3 25	$— —	$	$
Bangor	3 00	— —	1 90	
Bath	2 ?5	2 00	2 10	
Boston	2 ?5	1 80	2 ?0	
Bridgeport	1 ?5	1 00	1 20	
Bristol	2 00	1 40	1 45	
Cambridgeport	3 00	2 00	2 15	
Derby	2 00	— —		
Dighton	— —	— —	1 50	
East Cambridge	3 00	2 00		
Fall River	2 00	1 40	1 45	
Hackensack	1 95	1 50		
Hartford	2 ?5	1 50		
Jersey City	1 ?5	50		
Middletown	—	1 25		
Mystic	2 00	1 40	1 35	
New Bedford	2 25	1 50		
Newburyport	3 10	2 00	2 10	
New Haven	1 80	1 00	1 20	
New London	2 00	1 20	1 30	
Newport	2 00	1 40	1 45	
New York	1 25	50	70	
Norwalk	1 ?5	1 00	1 15	
Norwich	1 90	1 40	1 40	
Pawtucket	2 00	1 50	1 65	
Portland	2 50	1 80		
Portsmouth, N. H.	3 35	2 15	2 05	
Providence	2 00	1 40	1 50	
Rockport	— —	— —		
Saco	3 00	2 10		
Sag Harbor	2 00	1 40	1 35	
Salem	3 00	2 00	2 15	
Stamford	2 00	1 00	1 10	
Stonington	2 00	1 40	1 30	
Taunton	3 10	2 00		
Warren	— —	1 40	1 50	
Washington	1 25			
TO RIVER PORTS.				
Albany		1 00	— 60	
Catskill		— —	— 50	
Cockaackie		— —	— 50	
Coeyman's		— —	— ?5	
Cold Spring		— —	— 35	
Fishkill		— —	— 30	
Haverstraw		50	— 60	
Hudson		— —	— 50	
New York		— —	— ?0	
Nyack		50	— 60	
Poughkeepsie		— —	— 35	
Rhinebeck		— —	— 30	
Rondout		— —	— —	
Saugerties		— —	— 40	
Sing Sing		— —	— 60	
Stuyvesant		— —	— 55	
Tarrytown		80	— ?5	
Troy		1 00	— ?5	
West Point		— —	— 35	
Yonkers		40	— 60	

Foreign and Provincial Freights.

April, 1870.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons.....£13 10@£14 10

Liverpool.....12s.6d@14s.ton

TO NEW YORK.

Provincial

Sidney.....$—

Lingan.....—

Cow Bay.....—

Port Caledonia.....—

Little Glace Bay.....—

TO BOSTON.

Sydney.....$—

Lingan.....—

Cow Bay.....—

Port Caledonia.....—

Little Glace Bay.....—

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven.....$2 00

From Port Carbon, 8 cents per ton more.

Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 12
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 28

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & N. R. R from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R. / Cam. & Am. R. R.	1 09
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 49

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven.....$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$
Freight and towage	
Total	$

TO NEW YORK.

Lehigh Canal	$
Morris "	
Freight	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$
Morris "	
Freight	
	2,50
For re-shipment	
Total	$

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 1,40
Delaware Division Canal	1,30
Delaware and Raritan Canal	1,35
Freight	1,25
Towage	1,20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven	$ 40
Bridgeport	40
Southport	40
Westport	40
Norwalk	40
Stamford	40
	Per Boat.
Greenwich	$70 00
Port Chester	80 00
Mamaroneck	70 00
Glen Cove	55 00
New Rochelle	55 00
East Chester	60 00
West Chester	30 00
White Stone	30 00
College Point	25 00
West Farms	25 00
Flushing	30 00
Harlem and Mott Haven	20 00
Port Morris	20 00
Ninety-first street and Astoria	16 00

Boats beyond Port Chester, with less than 200 tons, $20 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.

	Per Ton.
To Manhattanville	9 cents.
Spuyten Duyvil	9 "
Yonkers	10 "
Hastings	12 "
Piermont	15 "
Dobbs' Ferry	15 "
Nyack	16 "
Tarrytown	17 "
Sing Sing	18 "
Croton Landing	19 "
Haverstraw	19 "
Verplanck's	20 "
Peekskill	20 "
West Point	21 "
Cold Spring	21 "
Newburgh	22 "
Poughkeepsie	22 "
Rondout	22 "
Boats of 100 Tons	Per Boat.
To Manhattanville, and Return	$12 00
Spuyten Duyvil, "	14 00
Yonkers, "	15 00
Sing Sing, "	25 00
Peekskill, "	25 00

Prices of Coal by the Cargo,

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, April 8. R. A.	AT NEW YORK, April 8. W. A.	AT PHILADELPHIA, April 8. R. A.	AT PHILADELPHIA, April 8. W. A.
Lump	$— —	$5 00	4 50	4 75
Steamer	— —	5 25	— —	— —
Broken	— —	— —	— —	4 50 to — —
Egg	5 75 to 6 25	5 50	— —	4 50 to — —
Stove	— to —	6 00	— —	4 50 to — —
Chestnut	4 50 to 5 40	5 00	— —	4 00 to —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	6 25	— —	— —	— —
Broken	6 25	— —	— —	— —
Egg	6 25	— —	— —	— —
Stove	6 75	— —	— —	— —
Chestnut	6 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.		— —	— —
New England	"		— —	— —
Locust Dale	W. A.		— —	— —
Honey Brook, Le'h	W. A.	4 75 to 5 75	— —	— —
Spring Mountain	" "	4 75 to 5 75	— —	— —
Sugar Creek	" "	4 75 to 5 75	— —	— —
Sugar Loaf	" "	4 75 to 5 75	— —	— —
Old Comp'y's	" "	4 75 to 5 75	— —	— —
Cross Creek	" "	4 75 to 5 75	— —	— —
Enterprise	" "	— —	— —	— —
Girardville	" "	— —	— —	— —
McMichael	" "	— —	— —	— —
Shamokin	" "	5 50	4 50	— —
Lykens Valley	" "	— —	— —	— —
Broad Top	" "	— —	4 50	— —
Hill & Harris	" "	— —	4 50	— —
Henry Clay	" "	— —	4 50	— —
Powelton	" "	— —	4 50	— —

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 50	$3 50	$3 50	$3 50	$4 00	$3 25
Wilkesbarre	3 50	3 50	3 50	3 50	4 00	3 25

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f.o.b. at Phila	$5 00
Lemon " " "	4 75
Cumberland Vein Coal	5 00
Cumberland C. & I. Co.'s on board, N. Y.	7 00
Maryland Coal Co. " "	7 00
Consolidated Coal Co.'s " "	7 00

(*Dealers in these coals may be found in our advertising columns.)

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at N. Y	4 50	4 50	4 55	4 60	5 25	4 40
Lackawana at Weh'kn.	— —	— —	— —	— —	— —	— —
Wilk'b're at Hoboken	4 75	4 75	4 25	5 25	5 75	4 75
Old Co. Lehigh at Pt. Johnston	— —	— —	— —	— —	— —	— —
Lehigh at E. Port	5 50	5 25	5 25	5 25	5 50	4 75

For freights to different points, see "Freights."

Prices of Foreign Coals.

April, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs., delivered

Prices of Gas Coals.

April, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 43 Pine st., N. Y.

Duty, $1 25.	Coarse. Gold.	Slack. Gold.
Block House	$1 75 @— 75	
Gowrie	1 75 @— 75	
Lingan	1 75 @— 75	
Sydney	2 13½@— 71½	
Pictou	2 13½@1 18¾	
Little Glace Bay	1 50 @1 00	
Caledonia	1 50 @— 75	

AMERICAN.

	Coarse. Currency.	Slack. Currency.
Fairmount Gas Coal Co. of N. Y.	7 50 @— —	
Despard Coal Co	$7 50 @— —	
Penn	— — @— —	
Newburg Orrel Gas	— — @— —	
West Fairmount Gas Coal	— — @8 00	

AT PHILADELPHIA.

Powelton	$7 80

Prices at Baltimore—April, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$6 00@6 75
Pittston and Plymouth	6 00@6 50
Shamokin Red or White Ash	6 00@6 25
Lykens Valley Red Ash	— —@6 50
Zerba Valley	6 00@6 25
Trevorton, Red Ash	6 00@6 50
By retail, all kinds per ton of 2240 lbs.	7 25@8 50
Georges Creek & Cumberland f. o. b. at Locust Point for shipping	— —@5 00
West Fairmount Gas f. o. b.	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

April, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 75

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

METALS.

NEW YORK, March 30, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ₱ lb; Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb.; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

Pig, Scotch No. 1, ₱ ton	33 00@35 00
Pig, American, No. 1	33 00@34 —
Pig, American, No. 2	31 —@32 —
Pig, American, Forge	30 —@31 —
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	88 00@97 5

		Store Prices.
Bar, Swedes, ord'y sizes, less 5 ₱ ct	115 —@125 —	
Bar, Refined	" "	77 50@ — —
Bar, Common	" "	72 50@ — —
Scroll	" "	87 50@115 —
Ovals and half-round	" "	95 —@110 —
Band	" "	95 —@ — —
Horse Shoe	" "	95 —@ — —
Rods, ⅝ to 3-16 inch	" "	85 —@120 —
Hoop	" "	105 —@145 —
Nail rod, less 5 ₱ ct	— 7	@— 7½
Sheet, Russia, as to Nos. (gold)	— 11	@— 12—
Sheet, Single, D, and T. Common	— 4½	@— 6½
Sheet, Galv'd, Nos. 14 to 25 List 15, 16 and 17 c. 25@30 P c. off		
Rails, English (gold), ₱ ton	58 00	@59 00
Rails, American, at Works in Pa	74 00	@75 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents: over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 16	@— 20
English Spring (2d and 1st quality)	— 7	@— 12
English Blister (2d and 1st quality)	— 11	@— 18
English Machinery	— 11½	@— 14
English German (2d and 1st quality)	— 13	@— 15
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— —	@— 18
American, Spring, do.	— 9	@— 12
American Machinery, do.	— —	@— 12
American German, do.	— 10	@— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.	
Copper, New Sheathing, ₱ lb	—	@— 31
Copper Bolts	—	@— 31
Copper Braziers, 16oz. and over	—	@— 31
Copper Nails	36	@— —
Copper, Old Sheathing, &c., clean	17	@— 18
Copper, Chili Pig	—	@— —
Copper, American Ingot	19¼	@— 19¼
Yellow Metal, New Sheating	24	@— —
Yellow Metal Bolts	24	@— —
Yellow Metal Nails	—	@— 24

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¼ cents ₱ lb.

Galena, ₱ 100 lbs	$— —	@— —
Spanish (gold)	— —	@6 20
German, do.	6 20	@6 37½
English, do.	6 20	@6 62½
Bar (net)	— —	@ 7 70
Pipe and Sheet (net)	— —	@ 7 70

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.	
Banca	35	@—
Straits	33	@—
English	31¼	@32

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 25 @8 50	$9 75 @10 00
I. C. Coke	7 00 @7 50	8 25 @ 9 00
Coke Terne	5 75 @6 00	6 75 @ 7 —
Charcoal Terne	7 50 @8 00	8 75 @ 9 50

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100 lb.

	Gold.	
Plates, Foreign	₱ 100 lbs. $6 00	@6 12½
Plates, Domestic	₱ lb. 10	@— 11½

REMARKS.

IRON.—The market for Scotch Pig remains about as last noticed. There is a good demand from the trade, but as the receipts are light, business is restricted, and prices have a hardening tendency. The sales are 300 tons Eglinton, ex ship, at $32 @ $33, and 100 do. Gartsherrie, $31 50 @ $35 from yard. American meets with very little inquiry, but prices are without quotable change. In Wrought Scrap we notice 300 tons No. 1 from yard, part at $39. There is a good inquiry for new Rails, and prices are steady at the decline previously noted. Sales have been made of 800 tons 50-lb. English, at $59, gold—the sale noted in our last should have read $58 @ $59, instead of $48 @ $49, as mis-printed. Bar from store continues without activity or improvement, or change of any kind.

Import, from Jan. 1st to March 31st, 1870.

	Bar.	Pig.	Sheet.
From Foreign Ports, tons	2,920	6,938	bdls. 66,285
Coastwise	....	....	.....
Total, tons	2,920	6,938	bdls. 66,285
Same time, 1869.	3,671	9,303	92,244

LEAD.—The demand for Pig is very limited, and we have only to notice the sale of 50 tons Spanish, ex ship, at $6 20, gold. Bar, Sheet and Pipe, $7 70 per 100 lb., net cash.

Import, from Jan. 1st to March 31st, 1870.

From Foreign Ports	pigs 112,919
Coastwise Ports	1, 01
Total	pigs 114,020
Same time, 1869	123,348

COPPER.—There is no change in the price of Manufactured Copper and Yellow Metal. (See quotations.) Ingot is quiet, but in prices there is no quotable change; 250,000 lb. Baltimore and Lake Superior sold in lots at 19½ @ 19¾ cents.

TIN.—In Pig there has been considerable business at higher prices, and the market closes with much firmness; the sales are 3,000 slabs Straits, part to arrive, at 32½ @ 33 cents; 100 do., 33 cents, thirty days—now held at 33 cents, cash; 6 tons English, 31½ cents; and 2½ do., 31¾ cents; Banca is now held at 35 cents, and English 32 cents, all gold. Plates are only in moderate demand at unchanged prices; sales have been made of 500 bxs. Charcoal Tin at $8 25 @ $8 37½ for I. C.; 250 do. I. C. Coke, $7 @ $7 12½, and 250 do. Charcoal Terne, $7 62½ @ $7 75, all gold.

Import, from Jan. 1st to March 31—	1870.	1869.
Pigs	No. 13,330	19,995
Plates	bxs. 132,623	204,905

SPELTER.—Foreign remains in the same stagnant position, and prices are quite nominal.

Import, from Jan. 1st to March 31st, 1870.

1869.....plates 130,173 1868.....plates 124,253

ZINC.—American Ox. Zinc, 6½ @ 7c.; French do., 10 @ 10½c.; Sheet Zinc, 9 @ 10c.

MANGANESE—Ox. Manganese, 4 @ 4½c. per lb.

Mining Stocks.

NEW YORK, April 6, 1870.

The prices of nearly all the stocks in the Mining share market are considerably depressed since our last report. Sales of Grass Valley are reported this A. M. at 23; Quartz Hill at 45, and Black Hawk at 30. Reference to our list of quotations elsewhere will give a full report of the market to date.

Petroleum stocks with but one or two exceptions have not materially changed. Bergen Coal and Oil is quoted at 26, and Blivin 26. Home is rather unsettled, being all the way from $3 50 to $4 50. The following is the latest report of the Stock Board:

	Bid.	Asked.
Bennehoff	30	—
Bergen Coal and Oil	26	—
Bliven Oil	26	—
Brevoort	1 00	1 00
Buchanan Farm	36	45
Central	52	62
Home Petroleum	3 50	4 50
National	—	—
N. Y and Alleghany	—	—
Northern Light	—	—
Pithole Creek	1 25	—
Rathbone	—	—
Rynd Farm	30	—
Second National	—	—
Tarr Farm	—	—
United Petroleum Farms	23	28
United States	70	—

San Francisco Stock Market.

At last we are favored with a list of sales of California and Nevada mining stocks in the San Francisco Stock Market, the most notable feature of which is the unsettled condition of Gould & Curry. On the 2d ult. sales of Kentuck were made at 90; Crown Point 26; Ophir 19; Alpha 17; Hale and Norcross $1 43, and Empire 25. Below is the latest report by telegraph:

SAN FRANCISCO, April 5, 1870.

(By Telegraph.)	1st Board.	2d Board.
Savage	48	—
Crown Point	—	—
Yellow Jacket	48	49
Kentucky	no sales	
Chollar Potosi	29½	30
Gould & Curry	3 27½	2 50
Ophir	—	—
Alpha	—	—
Bolcher	32	32½
Imperial	42	41½
Hale & Norcross	—	—
Amador	—	—

White Lead.

AN eminent German practical chemist has lately had his attention called to the defects of white lead prepared by the so-called English method, especially to the comparatively slight covering property which it possesses. As some of our readers are aware, this method consists in calcining lead in a reverberatory furnace with one per cent. of its weight of sugar of lead dissolved in water, and placing the mixture in horizontal troughs communicating with each other and closed above. A current of carbonic gas is conducted through the troughs, obtained usually by burning coke. A sufficient pressure is produced by the bellows of the furnace in which the coke is burned to force the gas through cooling tubes into the mixture, which is continually stirred during the introduction of the carbonic gas. This process, however, according to careful experiment, is not sufficient to produce a soft white lead, of a suitable coating quality, as the product is found to contain too much hydrated oxide of lead. On this account the suggestion was made—with an excellent practical result—to use two and a-half per cent. of neutral acetate of lead, dissolved in water, to one hundred parts of the oxide of lead, to which a slight quantity of vinegar is to be added. By acting upon this suggestion, it was found that the process of the fabrication of lead was greatly accelerated, and that a better article was produced, having an extraordinary coating power.—*College Courant.*

Engineering in Japan.

THE Japan *Gazette* says: "A sign of the times in Yeddo is the great desire to raise companies to carry out various manufactures or other business. One engineering firm in Yokohama (Messrs. WHITFIELD & DOUSON) have already turned out and sold two steam engines for rice mills, and have two others on the point of being finished and sold; and all are sought for by these companies. Besides this, they are buying steam launches for up-country river traffic, and inquiring respecting boats of a larger size. This is the result of a considerable relaxation of the interference that has hitherto been so detrimental to their operations.

India Rubber Tubing.

INDIA RUBBER tubing is slightly permeable to gas. The amount which escapes through the walls of the tube is, however, very small; it may be advisable sometimes to render any escape impossible. This can be done by giving the tubing a thin coating of a varnish made by dissolving one part and a-half of treacle, and two parts of gum arabic in seven parts of white wine and three and a-half parts of strong alcohol. The treacle and gum must be dissolved in the beer or wine, and the alcohol must be added very slowly, constantly stirring the mixture, or the gum will be thrown down.

Furnace Slag.

IN Belgium, furnace slag is now utilized by allowing it to run off into moulds along the sides of the furnace, in which it assumes the form of rectangular blocks of any size. When cold, the mass forms a compact, homogeneous slag, very much resembling porphyry, and equal, for building and engineering purposes, to the best natural stone that can be procured from the quarry.—*Ex.*

No Water in London on Sunday.

SOME of our foreign citizens complain that they cannot have their lager on Sunday; but what must we say of London, when the latest papers inform us that the attention of Parliament is called to the neglect of the water companies to supply *water* to the city on Sunday!

MINING COMPANIES AND STOCK QUOTATIONS.

GOLD AND SILVER COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
Alameda Silver		A. Queran, 108 Wall st	$2,000,000	$10 00		
Ada Elmore	South Boise, Idaho					
American Flag	Nevada District, Col	P. P. Fullerton, 71 B'way	600,000	10 00		
Atlantic and Pacific	Humboldt Co., Nevada.					
Bates and Baxter	Colorado			50 00		
Benton	Colorado	W. F. Drake, 15 Broad	500,000	5 00		
Briggs	Colorado	J. P. Davies, 19 Cliff	1,000,000	100 00		
Black Hawk	Colorado	C.T.Whittington, 48 Broad	2,500,000	100 00	60	100
Bobtail	Colorado	J. Stanton, Jr., 25 Nassau	1,000,000			
Bullion Consolid'ed Gold	Colorado					
Burroughs Gold	Colorado				22	25
Central Gold					2 00	2 05
Consolidated Gregory	Colorado					1 50
Combination Silver	Nevada			100 00		
Columbia Silver	Austin, Nevada	J. M. Brown, 155 B'way	5 000,000			
Commercial Silver		J. E. Smith, 26 Pine	3,000,000			
Corydon	Gilpin Co., Colorado	J. Samuels, 40 B'way	500,000			
Downieville	Colorado		2,500,000	25 00		
Eagle Gold	Gold Dirt Dist., Col	J. P. Davies, 19 Cliff	300,000	1 00		
Empire Gold and Silver	BodieBluff,MonoCo.Cal	H. K. Gates, 70 B'way	1,000,000			
Edgehill		t. Fullerton, 71 B'way	10,000,000			
Esperanza Silver		Ezra Clark, Jr., 43 William	400,000			
Fisk Gold		H. Johnson, 195 Fulton	500,000			
Forest Queen		E. B. Beet, 62 B'way	1,000,000			
Golconda Gold	Sherbrooke, C. E	H. Adams, 71 Broadway	2,000,000			
Gunnell Gold	Colorado	J. H. Rolston, 80 B'way	1,000,000	50 00		
Gunnell Central	Colorado	C. B. Bostwick, 16 B'way	3,000,000	10 00		
Gold Rock		R. M. Lockwood, 93 Wall	400,000			
Grass Valley					24	
International Silver		J. W. Brazier, 26 Pine	600,000			
Hope Gold	Colorado		5,000,000			
Holman			2,000,000	25 00		
Kipp & Buell	Colorado		300,000			
Knickerbocker Gold		J. H. Rolston, 80 B'way	200,000	100 00		
La Crosse Gold	Nevada Dist., Col	P. P. Fullerton, 71 B'way	1,000,000		10	12
Lander Hill T. & S	Nevada	M.L.Catherwood,74 B'way	1,000,000			
Lewis Gold	Georgia		1,000,000			
Liberty Gold					1	3
Manhattan Silver	Nevada	M. L. Ogden	400,000			
Maraposa common	California	Jas. H. Ferdon, 34 Wall	12,000,000			9½
Mariposa preferred	California	do. do.			18	18¾
Montana Gold		G. De Cordova	400,000		3	
Montana M. L. & M. Co.	Montana	A. M. Hoyt, 22 William	250,000			
Montrose	Clear Creek Co., Cal	W. W. Perkins, 71 B'way	1,000,000			
New York Silver	Nevada	Thos. Sproull, 78 B'way	1,500,000			
New York and Austin	Nevada	E. R. Siccomb, 70 Wall	5,000,000			
New York and Owyhee	Owyhee Co., Idaho		1,000,000			
New York and Eldorado		G. H. Munroe, 10 Wall	2,000,000		10	
N. Y. & Montana M. & D.	Montana	F. A. Chapman, 20 Nassau	1,250,000			
N. Y. & Silver Peach	Nevada	R. C. Root, 74 B'way	2,000,000			
N. Y. & Utah P. & M		W. H. Mailler, 108 Wall				
Nye						
Ophir Gold	Comstock Lode, Nev	L. C. Warner, 70 B'way	625,000			
Owyhee Gold		W. H. Smith, 43 Ex. Place	1,700,000			
Pahranagat Central	Nevada	J. E. Smith, 25 Pine	6,000,000			
Quartz Hill Gold		F. Bernard	2,500,000		50	
Reese River Consol'd	Nevada	W. B. Ogden	6,000,000			
Rocky Mountain	Colorado	S. M. Pond, 70 B'way	500,000	10 00	4	7
Rollins Gold		Thos. Bond, 132 B'way	600,000			
Sensenderfer	Colorado	H. A. Shewill, 19 Broad	1,000,000		1 00	
Silver Bend		F. W. Macy, 20 Nassau	1,500,000			
Silver Mt. Silver		H. A. Moen, 71 B'way	1,000,000			
Silver Peak & R. M	Nevada	W. B. Ogden, 52 Wall	5,000,000			
Smith & Parmelee	Colorado	W. H. Hollister, 6 Broad	2,500,000	20 00	1 55	1 65
Social & Steptoe Con		T. H. O'Connor, 24 Nassau	450,000			
Standard Gold		C. B. Bostwick, 169 B'way	500,000			
Symonds Forks					35	
Twin River Silver	Nevada	J. F. R. Hadden, 20 Nassau	800,000	100 00		
Texas Gold	Colorado		500,000	10 00		
Union Gold	Colorado	F. A. Potts, 110 B'way	1,200,000			
Wash. Mill & Silver	Nevada	W. W. Perkins, 71 B'way	300,000			
Wauba Yuma	Arizona	J. W. Sisby, 36 Pine	6,000,000			

COAL AND IRON COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Coal Co		M. A. Myers, 119 B'way	$1,500,000	$25 00		
Ashburton Coal Co		J. T. Rollins, 41 Pine	2,500,000			
Block House Coal		D. B. Keeler, Jr., 43 Pine	1,000,000			
Brewster Iron		H. Robison, 165 B'way	150,000			
Broad Top Coal & Iron Co	Pennsylvania	B. Love	2,000,000			
Cameron Coal Co		J. A. Simpson, 99 B'way	2,500,000			
Carbon Hill Coal Co		J. Silsby, 36 Pine	1,000,000			
Central Coal		F. P. White, 111 B'way	2,000,000	100 00		
Clifton Iron Co		P. H. Riordan, 34 Pine	1,250,000			
Columbia Iron		E. D. Webb, 77 Cedar	1,000,000			
Consolidation Coal	Maryland	J. S. Mackie, 71 B'way	5,000,000			
Crawford Coal		E. Clapp, Prest, 137 B'way	1,000,000			
Cumberland C. & I. Co		E. Kiscan, 90 B'way	5,000,000		27 75	32 00
Derby Coal Co		W. S. Davison, 71 Broad				
Dover Coal and Iron Co		L. Chase, 88 Wall				
Del. & Hudson Canal Co		R. H. Nerderpol, 7 Nassau	15,000,000	100 00	100	
Ebervale Coal		G.L Stout, Treas., 111 B'y	500,000			
Fall River Bituminous		D. T. Bauveit, 43 Pine	1,000,000			
Farrar Coal		C. H. Jones, 43 Pine	250,000			
Fisher Iron Co		M. Ellis, 19 William	100,000			
Hamp're & Balt. Coal		S. M. Pond, 70 B'way	500,000			
Iron Cliffs Co		C. J. Canda, 52 Wall	1,000,000			
Jackson Iron		G. P. Loyd, 119 B'way	300,000			
Kemble Coal & I. Co		R. A. Wight, 26 Ex. Place	300,000			
*Keokuk Coal		J. F. Franklin, 112 B'way	100,000			
Lackawanna I. & C	Pennsylvania	E. C. Lynde, 52 Wall	1,200,000			
Lewis Run C. & I. Co		C. A. Sanborn, 80 B'way	750,000			
Lykens Val. Coal Co		F. A. Platt, 13 William	800,000			
McKean Co. Bit. Coal Co		J. H. Rolston, 80 B'way	1,500,000			
Lehigh & Susquehanna		E. W. Cark, Philadelphia, Pa				
Mahanoy			400,000	100 00		
McNeal C. & I. Co		C. C. Godwin, 71 B'way	500,000			
Mount Riga Iron		G. M. Newton, 42 Cedar	300,000			
New Boston Coal		C. H. Ogden, 55 B'way	2,000,000			
N. Y. Con. C. & I. Co		A. T. Levine, 16 Wall				
N. Y. & Lehigh Coal		T. Simpson, 111 B'way	150,000			
Pacific Coal Co		G. Wrighton, 34 Wall				
Peekskill Iron Co		W. Murdock, 7 Nassau				
Pennsylvania Coal Co		E. H. Mead, 111 B'way	3,200,000	50 00		
Richmond Iron Co		A. B. Smith, 165 B'way	1,000,000			
Scotia Coal Co		C. S. Soper, 42 B'way	2,500,000			
Spring Mt. Coal		J. Runyon, 111 B'way	1,250,000			
Springfield & D'p Run C.		E. D. Webb, 77 Cedar	600,000			
Stout Coal Co		H. S. Comstock, 111 B'way	500,000			
Susquehanna & Wyoming		E. Potter, 40 B'way	1,000,000			
Tannerdale Coal		I. T. Ludlaw, 71 B'way	250,000			
Wash. Mutual Coal		M. C. Baker, 117 B'way	420,000			
West Point Iron Co		R. C. Brock, 110 B'way	500,000			
Wilkesbarre C. & I. Co		W. H. Tillinghast, 80 Br'y	3,400,000			
Wyoming Val. Coal Co		E. Potter, 40 B'way	1,000,000			

COPPER AND LEAD COMPANIES.	SITUATION OF MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED
Anita Copper	California	J. A. Ferguson, 8 Wall				
Corinth Copper	Corinth, Vermont	S. H. Howard, 191 B'way	$500,000	25 00		
Davidson Copper						
Eagle Harbor Copper	Michigan	W. H. Smith, 43 Ex. Place	500,000	25 00		
Evergreen Bluff Copper	Michigan	F. W. Caper, 44 Ex. Place	500,000	25 00		
Globe Copper		R. K. Rickard, 19 Nassau	200,000			
Grand Portage Copper Co		A. S. Kellogg, 22 Pine	500,000			
Guymard Lead		Samuel Vernor, 38 Pine				
Hilton Copper		W. H. Smith, 43 Ex. Place	500,000			
Hope Copper		J. W. Davis, 19 Nassau	500,000			
Hudson River Copper	New York	T. Clarkson, 22 William	1,500,000			
Indiana Copper Co		J. M. Mills, 25 Nassau	500,000			
Isle Royale Copper	Michigan	F. W. Caper, 44 Ex. Place	1,000 000			
Keweenaw Copper	Michigan	F. W. Caper, 44 Ex. Place	500 000			
Lake Superi'r Silver Lead	Michigan	A. S Kellog, 22 Pine	1,000,000			
Omiga Copper	Michigan	S. Cooper, 7 Pine	500,000			
Ridge Copper	Michigan	J. L. Gardiner, Jr., 43 Ex. P.	500,000			
Rockland Copper	Michigan	A. Fullerton, 71 B'way	500,000			
St. Joseph Lead	Michigan	J. W. Jones, 6 Broad st,	1,000 000			
St. Marguret Copper		E. P. Sutton, 43 Pine	250,000			
Schoolcraft Copper		R. Walsh, 22 William	500,000			
Superior Copper	Michigan	A. Fullerton, 71 B'way	500,000			
Union Copper		A. S. Kellogg, 22 Pine	500,000			
Vermont Copper	Vermont	J. C. Ely, 191 B'way	500,000			
Wallkill Lead, asst		S. M. Pond, 70 B'way				

MISCELLANEOUS.	SITUATION MINE.	SECRETARY AND PLACE OF BUSINESS.	CAPITAL.	PAR VALUE.	OFF'R'D.	ASKED.
American Zinc Co		W. E. Lawton, 19 Cliff	$1,000,000			
Bigelow Blue Stone Co		H. Bogardus, 14 Pine				
Quicksilver					9¾	10
Covill B. L. M. & M'f. Co		C. R. Bostwick, 302 Pearl	250,000			
Manhattan Marble		H. K. Gates, 70 B'way	300,000			
N. Jersey Zinc Co	New Jersey	A. H. Farlin, 61 Maiden L'e	1,500,000			

New Publications.

LES GRANDES USINES, PAR M. TURGAN: Paris, MICHEL LEVY FREBES.

The last number of this eminently useful publication has just been received. It contains a description of the agricultural experiments made at the imperial farm near Vincennes, by Professor G. VILLE, in relation to the manufacture and uses of artificial fertilizers and their influence in the development of diverse vegetables. The details are highly interesting and may be found in an extract from the present publication, inserted in the May number of the MANUFACTURER AND BUILDER.

We learn from M. TURGAN's work, that the emperor NAPOLEON, having heard ten years ago of the interesting experiments of Mr. VILLE, which that gentlemen had commenced and conducted without aid from any source, concluded to take the matter in hand, and from that time on established Mr. VILLE at his farm near Vincennes, paying all expenses from his private purse, and thus enabling the gentleman to prosecute his useful investigations to his heart's content. Soon afterwards a chair, that of Professor of Physiology of Plants, was created for Mr. VILLE at the Museum of Natural History, which he now occupies.

The emperor deserves the highest credit for his endeavors, thus freely manifested, to aid the cause of agriculture.

The next volume of the work is announced to contain descriptions of the establishments at Swansea, manufacturing zinc, copper, sulphuric acid and superphosphate of lime.

Report of the Directors to the Stockholders of the Pewabic Mining Company for the year ending Dec. 31st, 1869.

We have before us the annual report of the Pewabic Mining Company, including Director's report, Secretary's accounts, and the report of the Superintendent. This is in many respects an exceedingly interesting document, especially so, as it reports upon a business which, during the last year, has been all over the United States notoriously depressed. The market for copper during that period has been so very low, and the prices offered for that metal have been so little remunerative, that it becomes a matter of congratulation if a mine has even been able to pay expenses.

From the director's report we learn that the company have managed to sell their copper, 975,488 pounds, at 23 cents, an average which must surprise those who have watched the market during the year, and which testifies to a first-rate management of the financial affairs of the company. The whole product of the mine is given at 1,230,779 pounds of 78 per cent. mineral, or 960,409 pounds of smelted copper—83,114 pounds less than the previous year. The amount of rock taken from the mine was 3,079 cubic fathoms—612 fathoms more than in the previous year; but the yield of ingot copper was only 312 pounds to the fathom, against 420 pounds the year before. This difference in the quality of the rock is equivalent to a falling off of 332,632 pounds of ingot copper. The poor streak, which gave the above results, appears to be worked through, however; and, according to letters from the mine, "the mine is looking better at present than it has been for two years past." In consequence of the low percentage of copper in the rock, the mining cost per pound of ingot copper was increased 3.70 cents, while all other expenses were reduced 1.68 cents per pound.

The unusually wet season at the upper lakes has occasioned an increased cost of pumping, while the cost of hoisting has been diminished, although the engine had to perform greater duty than the year before. The largest reduction in cost has however been effected in the expenses of the stamp-mill. The reduction cost in 1868 of one ton of rock had been $1.21, while in 1869 this has been reduced to $0.904, a saving during the year of $13,219 20.

On the 15th of January the long pending consolidation with the Concord Mining Company was consummated. This is a step in the right direction, and the stockholders of both companies will undoubtedly feel the beneficial effect very soon.

The statement of available assets and liabilities shows an excess of the former over the latter of $50,843 75. The total valuation of property at the mine is given as $469,512 62; supplies on hand, $34,746 73; total mining cost for 1869, $202,652 93, as follows:

Mining labor	$83,645 92	
Tramming and hoisting	39,391 25	$123,037 07
Surface expense	3,748 73	
Selecting and breaking rock	13,699 51	
Office expense	1,789 03	
General expense, taxes, insurance	6,670 62	
Team account	2,.38 11	
Tram-road account	5,.06 08	
Machinery account	5,991 84	
Changing house	45 06	
	$39,288 98	
Less hospital account	$584 96	
Less rents collected	1,8 4 45	2,389 41 36,899 57
Stamp house		42,024 94
Ingot barrels		691 35
		$202,652 93

The following shows, besides other items, the excellent work performed by the company's stamp mill:

Number tons rock stamped	43,199
Actual running time with two heads	250-9-24 days
Average number tons rock stamped per day	172-4-5
Average cost per ton rock stamped	90.4
Average number of men and boys employed	38
Average monthly wages	$40 42
Time lost taking up heads, repairing, and waiting for rock	62-15-24 days
Number of cords wood consumed	2,294¾
Number tons coal consumed	1,332-618-2000
Number tons of rock stamped per cord wood	10

The Pewabic is now the deepest mine in the neighborhood of Portage lake. It has reached a depth of 1,400 feet, and the vein holds out at that depth as well as ever; the nineteenth level seems to show throughout an excellent quality of stamp-rock, while the barrel copper is not so plenty, and mass copper is not in sight; but, like the poorer qualities of ore are the main dependence of all those mines in which minerals occur in the form of chemical combinations, so is the stamp copper the main and most certain reliance of those veins, which carry the native metal. 1,400 feet is not a very great depth for a mine, but when we consider that this depth has been reached in fifteen years, we must wonder at the rapid progress in so hard a rock as the Lake Superior copper mines are generally blessed with, and at the almost fearfully fast rate of extracting mineral so far practised at these mines, and which is well calculated to astonish European miners, who are used to much slower progress. At the same time, it is gratifying to see that a mine which has to hoist and pump from such a considerable depth is nevertheless able, even in the face of the most unfavorable state of the market, to continue working without pecuniary loss, and even to reach a small profit.

THE Report of the Supervising Architect of the Treasury Department for 1869, is an interesting review of the building operations of the government during the year. Mr. MULLETT reports the completion of the court-house and custom-house at Springfield, Ill., and the custom-house at Bangor. Repairs have been made in numerous quarters, and the following buildings have been commenced: post-office and sub-treasury at Boston; post-office and court-house at New York; branch mint at San Francisco; custom-house at Portland and Astoria, and the branch mint at Dalles City, Oregon. Work is to be commenced upon the assay office at Boise City, Idaho, and upon the court-house and post-office building at Omaha, Nebraska.

Mr. MULLETT's ability and integrity have been vehemently attacked in Congress, and it is understood that the charges against him will receive investigation, on his own demand. The general impression appears to be that they are the product of jealousy or disappointment on the part of those whose plans have been defeated by him. The New York post-office is alleged to have been a case of this kind.

The design for the post-office prepared by Mr. MULLETT, and doubtless to be erected, is quite different from that which was published as accepted by the commission. It is a rich and heavy building, in the style of INIGO JONES, and surmounted with French roofs and domes, presenting a very effective sky line. The difficulties of turning the corners, and of the irregular lot upon which the building is to stand, and to which it must conform, are skilfully overcome; the grouping of pillars and the lines of windows have a good effect; the interior is well-lighted and convenient, and the whole plan is well adapted for its practical use, as well as calculated to be an ornament to the city. The objectionable feature of an inside corridor for horses and wagons, between the sidewalk and the offices, rendering the latter dark and unpleasant, and encroaching on the interior space, is done away; and the shelter for receiving and discharging mails is afforded by a light canopy roof, thrown out at one side of the building. The cost of the whole building will be something like three million dollars.

THE PROGRESS AND CONDITION OF SEVERAL DEPARTMENTS OF INDUSTRIAL CHEMISTRY is the title of the report of Mr. J. LAWRENCE SMITH, one of the United States Commissioners to the Paris Exposition. The great importance of the subject assigned to this gentleman appears upon a simple survey of the table of contents. The successive chapters of the book treat of the manufacture of sulphuric acid; soda and salts of soda; potash and its compounds; ammonia, baryta, magnesia and alumina; chlorine, fluorine, manganese and carbonic acid; the industrial production of oxygen, hydrogen, and other elements; the manufacture of illuminating gas from coal, and the utilization of the waste products; and the stearic acid industry. Mr. SMITH has furnished on this interesting series of topics an entertaining and suggestive, but not a very thorough or exhaustive report. Perhaps the two features of greatest merit are the chapters on sulphuric and stearic acid. The former contains a full description, accompanied with complete drawings, of the apparatus employed in the manufacture of sulphuric acid from pyrites, and the latter contains a description of the candle manufacture by the process of Dr. MILBY. We shall probably soon find room for these chapters, as well as that on soda and its salts, in the columns of this journal.

Iceland Spar in Virginia.

CABINET OF PRACTICAL GEOLOGY AND MINING,
U. S. GENERAL LAND OFFICE, WASHINGTON, D. C.,
March 28th, 1870.

TO THE EDITOR—Sir: Finely crystallized transparent masses of Iceland spar have been received at this office, from Rockingham county, Virginia, where it is obtained in large quantities. This substance is sometimes called rhombic spar, calcite, etc., and in its opaque condition is not at all uncommon. Pieces of a suitable degree of transparency are, however, rare, and in the European capitals will bring a good price. It has the property of doubly refracting the rays of light, so that a piece of half-inch or more in thickness laid upon written characters will represent them duplicated. As this mineral is colorless, and is more highly double-refracting than most others, it is much employed in making optical instruments for polarizing light, and exclusively to construct the well-known NICOLS prism. Perfectly transparent pieces only are employed for this and other apparatus, some of which are in constant use in the sugar refineries for estimating the amount of crystallizable sugar contained in any specimen of syrup, the strength of which is desired to be known. American opticians have generally supplied themselves from abroad, and it may be well to know of this locality in Virginia, where it is said to abound in any desired quantity. Very respectfully, A. R. ROESSLER.

The National Academy of Sciences.

THIS body commenced a session at Lincoln Hall, in the city of Washington, on the 8th inst., Prof. HENRY, of the Smithsonion Institution, presides. Besides the distinguished men who are members of the Academy, there are many eminent *savans* attached to the various Departments and Institutions of Washington, who will doubtless be invited to attend the sittings. We need only allude to the gentlemen who constitute the celebrated social scientific club of Washington—one of the most charming circles of genius, learning and good-fellowship anywhere to be found. Every man, whether Academician or mere mortal, likes the presence of intelligent and appreciative auditors; and the National Academy cannot do better than to enliven by the faces of sympathetic guests its otherwise, perhaps, too stately meetings.

The Importance of Diffusing Knowledge in Relation to Mineral Deposits and their Chemical Constitution.

BY PROF. A. R. ROESSLER.

THE mineral wealth of a State may remain in obscurity forever, unless diligent search is made through the instrumentality of State surveys, or the private enterprise of landowners. In either case, the establishment of some common centre for the deposition of specimens, and for intercommunication is important, since such a place will be resorted to as an exchange where commodities can be examined, and information diffused. The effort by the United States General Land Office to accomplish this in Washington city, we claim to be not only praiseworthy in every respect, but it has also been eminently successful. The records of the office will show, that every day information is sought after, leading to the acquisition of most important information as to the locality of raw material useful in the manufacture of articles in which metallic and earthy substances form a part. The potter requires clays of various degrees of fineness, and which, when burned, will give a substantial and suitably-colored ware. The glass-maker requires pure sand, pure lime, soda, salts, preparations of lead, and other materials, out of which he manufactures window glass, jars, drinking vessels, bottles, etc.; and the paper-maker uses no inconsiderable quantity of earthy materials in his business. The manufacturer of chemicals, forced to change his processes almost every day in consequence of the discovery of raw material which enables him to cheapen his methods or make a purer article, here seeks his information. Some of the more prominent cases of this kind of recent occurrence will be found interesting.

The discovery, a few years ago, of an almost inexhaustible bed of potash salts in Prussia has so cheapened that alkali, and changed the market to such a degree, that the American potash business is very seriously affected. This Prussian article is found in connection with a mine of rock salt, not unlike that which was opened at Petite Anse Island, in Louisiana. The geological causes in operation during the deposition of the salt in both cases were the same, and the existence of the potash salts in the American mine may be confidently looked for. A recent discovery has been made of an immense deposit of sulphur, one hundred feet thick, in one of the Southern States. From sulphur, oil of vitriol is made, and the quantity of the latter now required in the various arts is so large, that the amount consumed is regarded as the test of progress in the civilization of nations. It requires no argument to show that an inexhaustible supply of sulphur, to be had within our own borders, relieving us from importing it from the Mediterranean, is of vast and general importance. The gold and silver mines of the western part of the continent require, for the economical beneficiation of the precious metals, untold amounts of quicksilver, of soda, borax, common salt, and other materials; almost in all cases beds of these substances are found close at hand in the surrounding valleys, thus relieving the gold and silver product of an enormous charge for foreign substances, which, if the companies were subjected to this outlay, would break up nearly the whole mining industry. When a light porous absorbent earth was wanted, to prepare with it the blasting agent known as dynamite, a stratum of infusorial earth, which fulfills all the required conditions, and enables the miner to use a most dangerous, and at the same time most efficient explosive without fear, was found close to San Francisco, under the auspices of the California geological survey. The discovery of large deposits of a mineral, called Beauxite in the south of Europe, has changed in a few years the whole method of making salts of alumina, so useful to the dyer and calico printer, simply because this substance, a species of ferruginous clay, contains only two or three per cent. of silica, while all the known varieties of clay ordinarily have about fifty per cent. The chemical manufacturer was thereby relieved of great expense and delay in getting out his products for market, by working with a new process much quicker than the old one.

The instances above given serve to show the great value of even such common substances as clay, salt, lime, sulphur, to the manufacturers of a nation, and the great importance which should be attached to the diffusion of knowledge concerning them, of the localities where they may be found, and their chemical composition.

It is only from a common centre that the owner of valuable earths and ores can make his commodities known to the manufacturer, who in turn is anxious to learn where they may be found, and who may have been inquiring for them for years in vain. An interest so important to the nation should be fostered by all means proper under our government, and as the simplest means of effecting this, a proper place for the exhibition of the minerals, and for their chemical examination, should be established, and the results ought to be published from time to time for general information.

Not Exactly.

IN a recent notice of President BARNARD's report, the types made us speak of Meteorology instead of Metrology, which is one of the subjects of that report. We are not yet ready to class Meteorology among the "exact sciences," especially in view of the weather during the past month. For the benefit of our delinquent compositor and proof-reader, we will add, that Metrology has nothing to do with weather, but is the science of weights and measures.

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

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The Sutro Tunnel Debate.

THE debate on the Sutro Tunnel, which occupied the morning hour in the House on the 17th, 22nd, and 23d of March, was very lively and interesting. The limited extracts given in another column do no justice to the speakers quoted, nor to the scope of the debate. The latter deficiency we shall endeavor to repair by giving a brief statement of the essential points at issue.

The Sutro bill now in question is not that which proposed to grant government aid to the tunnel. That bill received no final action in the last Congress, and has never been introduced into this. The present bill is from another quarter, and virtually hostile to the tunnel scheme. It seems there is a question of law between the Comstock companies and Mr. SUTRO as to the force of the contracts formerly executed by the companies. By these contracts, the companies were bound to pay Mr. SUTRO, after the tunnel was within five hundred feet of the west wall of the vein, a royalty of $2 per ton on all ore extracted from the mines—that is, they were to pay royalty from the time they began to be benefited by the tunnel. They now claim that the contracts are void, by reason of non-fulfillment of conditions on the part of Mr. SUTRO; but unfortunately, the general mining law embodies the same provision, and every company working on the Comstock lode is obliged to accept from the Government a patent, containing this conditional royalty to the Sutro tunnel—or go without a patent altogether. The bill lately under discussion proposed to relieve the patents of the companies from this clause, and to prevent the law from being so construed as to give Mr. SUTRO any other rights than those to which his contracts entitled him.

The arguments for the bill were pressed with great earnestness by Messrs. SARGENT and FITCH, and were chiefly these:

1. The conditions imposed by the contracts have never been fulfilled by Mr. SUTRO. In equity he has no claim; but the construction of a single clause in the law gives him a perpetual threatening claim. He threatens at any future time to run his tunnel to the vein, simply in order to get the royalty.

2. The tunnel, which was supposed to be necessary when first proposed, is now not desired. The railroad has sufficiently cheapened transportation; the ores now extracted are in upper levels, and of such low grade as to be unable to bear a royalty of $2; there is no water in depth, and ventilation by shafts has been found quite as feasible as by tunnels. Under these circumstances, the prosecution of the tunnel is an outrage on the owners of the mines.

These arguments were met by the following, on the part of Messrs. FERRIS, KERR, and others:

1. The failure of Mr. SUTRO to perform his part of the contracts is due to the bad faith and secret opposition of the party controlling the companies, and known as the Bank of California party. Hence they are estopped from pleading in their own favor the delinquency they themselves labored to effect.

2. The contracts referred to were equitable, and are so still. Neither under them, nor under the law, is any company obliged to pay royalty until the tunnel is within five hundred feet of the vein. *Outside of the contracts altogether*, the privilege granted to Mr. SUTRO is reasonable; and, were he now applying for it, instead of defending himself from being robbed of it, the House would grant it to him *de novo*. As for the assessment on the companies, it is like the taxation of the willing or unwilling property-holders benefitted by a sewer, a pavement, or other necessary public improvement.

3. The denial of any advantages from the tunnel is met by the former declarations of the Nevada delegation, and of the same parties as now oppose the tunnel, who then urged the Government to subsidize it.

4. The statement that drainage, ventilation, etc., can be as well effected without the tunnel as with it, and that recent developments prove the tunnel to be quite unnecessary, was disputed by several gentlemen, and eloquently opposed on an unexpected and striking ground by Mr. KELLY, who demanded for the laboring miner the right to additional protection of life by means of such a safe exit from his dangerous field of labor.

5. Alleged wrongs to property-holders by the construction of the law are questions which cannot come up until courts have construed the law. This has never taken place; the legal relations of the parties under former contracts have not been judicially determined; no wrong is yet apparent; and when such shall appear—as, for instance, when it shall appear that the Sutro tunnel is not intended *bona fide* to benefit the miners, or that it is not (in the absence of malicious opposition) prosecuted with due diligence—it will be time enough to appeal to Congress for relief.

The bill, though actively supported by the senators and representatives from California and Nevada, was defeated by an overwhelming vote. We think the House decided rightly. The legal complications of the matter do not concern us. We base our opinion, and we think the House based its action, on the conviction that the Sutro tunnel is a necessary and important work. Either the companies wish to run it themselves, after putting Mr. SUTRO out of the way, or they do not wish to have it run at all. In the former case, there is no reason why the original proposer and promoter of the plan should be set aside in favor of a heterogeneous combination of shifting proprietorship, always at odds with each other, and almost certain not to carry out the work. When the thirty or forty companies on the Comstock lode can point to any one scheme which they have ever harmoniously executed for the benefit of all, it will be perhaps less preposterous to intrust them with this great work. As we have often said, the companies ought to have run this tunnel long ago. They have wasted on superficial tunnels, not one of which is now used, more money than this would have cost; they have thrown away an equal amount in litigation; and the reason is, that they have been operated in the interest of temporary owners, of immediate profits, and of stock speculations.

But their present cry is, that the tunnel is quite unnecessary, because they are working out old reserves of low-grade ore near the surface, and do not need deep drainage, ventilation, transportation, etc. This is a confession of the plan formed two years ago, to build a railroad for cheapening transportation, and then gut the mines of what ore is available, suspending explorations in depth, and abandoning the ground when the present reserves are worked out. It is a plan which ruins the mines, but may enrich the present owners. We have only to say of it, that it demonstrates the necessity of just such a law as that of which the companies now complain. They should be forced by the Government, which still owns every foot of the Comstock, to allow others to go forward with the explorations which they propose to neglect.

The question is not one of Government aid in money to the tunnel; it is merely, whether the ancient and approved custom of a tunnel-royalty should be allowed in this case, as an encouragement to a measure which promises to explore this important vein in depth.

It is true that a few shafts on the vein are very deep, and that comparatively little additional water has been met in them; but increasing depth, and the consequently increasing expense both of pumping and hoisting, present difficulties enough, without any increase of water. As for ventilation, it is well known that the use of the Root blower has become indispensable in the deep mines; and it has been asserted that the artificial ventilation so produced has dried the timbers underground, so as to make them very combustible. The awful fire in the Crown Point, Kentuck and Yellow Jacket, is an illustration of this kind of danger, which, we suggest, does not need to be repeated. In case of a fire occurring in a mine provided with a deep tunnel for ventilation, the draught of air would inevitably be in at the tunnel, and out by the shaft. Consequently, miners escaping in the direction of the tunnel would meet with fresh air, and a safe exit. In the catastrophe of last year, the unfortunate victims were cut off from escape by the fire itself, suffocated first, and burned afterwards.

Messrs. SARGENT and FITCH made strong arguments on the legal aspects of the case; and in that particular, we do not attempt to judge between them and the majority of the House; but they are not on tenable ground when they condemn the plan of a deep tunnel to the Comstock lode; and we think they lost their sturdily maintained battle, simply because they assailed not only the law, but the thing itself, whereas the House considers it of national and immediate importance. Those about to leave a sinking ship may not care to see her saved; but the people do not yet give up the ship.

The California Geological Survey.

THE news that California has renewed on a liberal scale her Geological Survey, is emphatically good news. We do not entirely approve the plan of the work, as at first projected, believing that a smaller outlay, spread over a much longer period, might be made in the end more effective. But our criticisms apply to all State geological surveys as at present conducted, especially in newly settled States; and it would be ungracious to obtrude them at present, as though they had any special and exclusive application to the survey of California. There is no doubt of the great ability of Prof. WHITNEY, and none, in our minds at least, of the unwisdom of stopping his operations, just as they were about to bear valuable fruit. We heartily congratulate him upon the tardy recognition of his services, and the new life infused into his work. At some future time, our views on the general subject of geological surveys will be more appropriate.

We trust that several most important practical points will be elucidated by the survey at an early day. Among them is the age of the Table Mountain tertiary strata, which are now declared to contain the bones of mammals. The subject was discussed at the meeting of the American Association in Chicago; and, if our impressions (from hearsay information) are correct, Prof. WHITNEY was inclined to deny the fossils, because the strata are Eocene, and to pronounce the strata Eocene, because there are no fossils in them. These propositions stand well together; but they fall together with equal facility—and the distinguished chief of the California survey will now be able to give us later and more independent conclusions. The question is intimately connected with the evidences, in that State, of the antiquity of the human race, which are by no means confined to the Calaveras skull.

Another matter of much interest is the accurate determination of the ancient river system, and its connection with the deep gold-bearing cement and gravel deposits. The whole auriferous belt of California, with its placers and lodes, deserves the most careful study. We understand that much information on this subject, collected by the Survey, awaits arrangement and publication. It is a pity that it has been delayed so long. The early publication of such facts constitutes a great part of their value to the community.

The Perils of Mining.

THE report of the Commissioners appointed to inquire into the condition of all mines in Great Britain, has been issued. From a careful consideration of the evidence submitted, and of the reports and documents prepared in the course of the inquiry, and from the knowledge acquired by visiting the districts, and by inspecting mines therein, the Commissioners have agreed to the following resolutions:

I. That there is a great excess of sickness and mortality among metalliferous miners, which is mainly attributable to the imperfect ventilation of the mines.

II. That several other causes, both general and local, largely contribute to impair the health of the miner—namely, exposure to cold and wet, and to sudden alternations of temperature; wearing wet clothes; inhalation of gritty particles; and the exertion of climbing ladders from great depths. We, therefore, recommend—1. That every mine should be provided with proper houses, conveniently situated, in which the men can change and dry their clothes. 2. That surface work should, as far as practicable, be carried on under shelter, and that suitable places should be provided in which the women and children employed at the mines might take their meals. 3. That in order to avoid the evils consequent on climbing ladders, mechanical means should be provided to convey the men to and from the surface when the mines are of great depth.

III. That accidents are of frequent occurrence in metalliferous mines; and that they principally result from miners falling from ladders and stemples, or from one level to another; from falls of the rock or stuff; from want of caution in blasting; from defective gear and imperfect supervision of machinery; from the sudden irruptions of water or foul air, and from the bursting of boilers. To obviate, as far as possible, the various accidents to which miners are exposed, we recommend: 1. That no ladder-way should be allowed in a drawing-shaft without the shaft being properly divided or bratticed off from the footway, and that efficient collars should be fixed at moderate distances in all footways, whether the ascent or descent be by ladders or stemples. 2. That shafts, winzes, sumps and shoots should be more carefully guarded. 3. That more stringent rules should be enforced in regard to blasting, with a view to preventing accidents, and that bronze tamping-rods and prickers should be supplied to the men. 4. That the persons having charge of the footways and other works under ground, should daily enter in a book a report of their condition to the agent or captain of the mine, which should be produced in case of inquiry. 5. That the boilers and other machinery should be periodically examined by the mine engineer, and that a monthly report thereon should be given in to the captain or agent, to be produced by him should occasion require. 6. That the men should not be allowed to change in the boiler-house, which none but those in charge should be permitted to enter. 7. That all boilers should be provided with two safety-valves, a water-guage and a steam-whistle. 8. That plans and working sections of all mines, on their being abandoned, should be deposited at the office of the Clerk of the Peace for the County, and at the Government Mining Record Office in Jermyn street, for reference in case of working being resumed or new mines opened up in the immediate vicinity.

IV. That abandoned shafts, and old workings unprotected at the surface, are a cause of serious danger, not only to the miner but to the public. The accidents consequent upon the practice of leaving abandoned shafts and workings insufficiently guarded or wholly unprotected, are so numerous that we think it very desirable that an efficient and easily available legal remedy should be provided, in order to guard the public from this prolific source of danger.

V. That the employment of boys underground at an early age contributes to produce disease and premature death. We, therefore, think it desirable that, as a general rule, no boys under the age of fourteen years should work below the surface.

VI. The system of mine clubs as at present in general operation is unsatisfactory, as not providing for cases of sickness as well as for accident. We, therefore, suggest the adoption of such a system of mine clubs as would afford men sufficient maintenance during sickness as well as while suffering from the effects of accident.

Temperature of Water at Various Depths.

MR. J. HUNTER has analyzed sea-water from various depths. The water was collected by fastening to the sounding-line a large brass cylinder, provided at the top and bottom with valves opening upwards. During the sinking of the cylinder the water passed through; when the cylinder was raised the valve closed, and a sample of the water was thus captured from the lowest depth to which the cylinder had sunk. The observations were made at intervals of 250 feet, down to a depth of 2,090 feet. The temperature was found to vary from 50.5 degrees at 250 feet, to 36.4 degrees at 2,090 feet, the decrease being very rapid at first, but at a lower depth scarcely appreciable. The specific gravi y was 1.0275 at the surface, and the same at 1,000, 1,250, 1,500, and 1,750 feet respectively; while at 750 and 2,090 feet, it was 1.0273, and at 250 and 500 feet, 1.0274. The number of grammes of oxygen per 250 c. c. varied very irregularly, being greatest at 1,500 feet, namely, 0017, and smallest at 750 feet, .006. The total quantity of gas per 100 c. c. also varied irregularly, the largest quantity, 2.90, being at 1,250, and the smallest, 2.20, at 750 feet. With respect to the composition of the dissolved gas, the proportion of carbonic acid was very large, and increased (with little exception) proportionately to the depth, from 25.12 at 250 feet, to 35.92 per cent. at 2,090 feet; the proportion of nitrogen and oxygen decreased *pari passu*, that of the former nearly regularly from 52.42 at 250 feet, to 43.54 per cent. at 2,090 feet; while the decrease in the oxygen was less regular, being 22.46 at 250 feet, from which it fell to 20.20 at 1,500 feet, but had increased to 20.70 per cent. at 1,750 feet, and 20.54 per cent. at 2,090 feet. The locality of the observations was latitude 47 deg. 39 min. N., longitude 11 deg. 33 min. W.; the date July 23d, 1869.—*Engineer.*

Separating Silver from Gold.

MR. F. B. MILLER'S process of separating silver from gold is about to be used at the Sydney Mint. The silver is readily separated by passing a stream of chlorine gas into the melted gold for about an hour and a half, as it lies in a crucible heated in an ordinary melting furnace. The chlorine is at first rapidly absorbed, and the process is completed when a brownish yellow vapor appears. The chlorine is conveniently evolved from a self-acting generator, and 2000oz. of gold are readily refined in five hours, by three melting furnaces, 98 per cent. of the gold being delivered ready for coinage on the same day. The gold thus refined is perfectly tough, and contains only about one-half per cent. of alloy. The ultimate loss of gold is found to be only 19 parts in 100,000; the loss of silver is 240 in 100,000. The cost of refinage, including the above loss, but excluding rent of premises and expenditure, is five farthings per ounce. The silver is obtained in the form of fused chloride, and is reduced to the metallic state by plates of zinc combined with slabs of the chloride into a galvanic arrangement, devised by Dr. LEIBRISS. In twenty-four hours the chloride is completely reduced to the state of spongy silver, and 1400oz. or 1500oz. could thus be readily treated in a day. No acid is required, and the zinc consumed is only 25 per cent. of the chloride reduced.

Sulphur.

SEVERAL deposits of sulphur have been discovered in California, where, in one establishment, some ten tons are now refined daily. The most recent report is from the Suez Canal, where, on the shores of the Red Sea, at the entrance of the Gulf of Suez, two inexhaustible deposits have been found. One, at Djemsah, is located in a perfectly rainless desert on the African coast very near the sea, and consists of a hill six hundred feet high, composed entirely of sulphur. In order to obtain the sulphur it is blasted like the rock in a common stone quarry. Two hundred Arab laborers are occupied, under the supervision of French engineers, and produce some ten tons of sulphur a day. A railroad is in course of construction for the purpose of transporting the sulphur rapidly and in large quantities to the furnaces in which it is refined, and thence to the coast to be shipped. The Viceroy of Egypt buys from the French company all the sulphur at eighteen dollars per ton. The other locality is Ranga, five hundred miles from Suez, and also near the coast on the African continent. In this case, also, the sulphur appears in the form of rocks, much purer than the former, of a bright lemon-yellow color, but covered under the earth, so that it must be obtained by tunnelling. This sulphur mine has not yet been worked to any extent.

The New Bridge Across the Hudson River at Albany.

THE approach to the bridge from the west will be a curve of about 725 feet radius and an ascending grade of about 60 feet to a mile, both commencing in the rear of the Delavan House, cutting the south-west corner of Maiden Lane and Quay street, and extending across the basin to the pier, which it will cross about 150 feet north of State street bridge. The tracks will cross Maiden Lane and Quay street, at a sufficient elevation to allow all street traffic to pass underneath. The sharpness of the curve makes it necessary to cross the basin with seven short spans of about 70 feet each, but the piers will be placed in line with those of State street bridge, so that neither the current nor the passage of boats will be obstructed more than they are at present. From the Albany pier the bridge over the main channel of the river will extend straight and level, at a clear height of about 28 feet above ordinary tide level, the same as the present bridge, for 1,000 feet, landing in Van Rensselaer at the east side of the river, at a point about 50 feet north of the old Hudson River Railroad ferry landing. Beginning at the west end this portion of the bridge will consist of first, one span of 220 feet; next a swing bridge 280 feet long, giving two openings, each 115 feet wide in the clear for the passage of vessels, and then two spans of 250 feet each; thus having but four piers in the river. The total length of the bridge from the west side of Quay street to the east abutment will be 1,640 feet. The abutments and piers will be of first-class stone masonry, and the superstructure entirely of wrought iron; it will carry a double line of railway tracks, and also one and perhaps two sidewalks for foot passengers. From the east end of the bridge, the line will cross Van Renssalaer Island, here about 700 feet wide, with a descending grade of about forty-five feet to the mile, crossing the small channel that separates the island from the main land, and will connect at East Albany with the railway lines running south, east and north. The construction of the bridge will consume about a million feet of timber in the foundations, 12,000 cubic yards of stone, and nearly 2,000 tons of iron, and is to be commenced immediately, and completed during the season of 1876.—*Albany Argus.*

Chinese Ink.

THE manufacture of Chinese ink, to give it its proper term, is carried on upon a very large scale at Shanghai, where a very superior description is prepared. The cause of the difference in quality between the various inks made in China results from the non-employment of a constant material for the production of the lamp-black. In order to impart an agreeable odor to the production, the Chinese add a small portion of musk and camphor. Ordinary Chinese ink for home use is not scented in any manner whatever. The gilded mystic letters are first formed by the action of the mould. When the cake is dry, the letters are traced over with a solution of gelatine in water, and the gold or copper is laid on with a fine brush. Like their neighbors, the Japanese manufacture Indian ink, but consider it of a quality inferior to that which they obtain from the mainland. Not having given so much attention to the matter as the Celestials, they are not so well versed in the manner of preparing the lamp-black, which is the real secret of the whole art,

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CAPTAIN HANS BUSK exhibited at a recent *conversazione* of the Royal Society a model of a steam life-ship, which he offers as likely to render good service where the life-boat fails. The life-ship with a crew of thirty men is to keep the sea, and in case of falling in with a vessel in distress would render assistance from the windward, which would be easier and often more effectual than when borne from the leeward in the teeth of a gale by a life-boat. The life-ship could "warp down" a boat to a helpless vessel, or, approaching near and dropping anchor, could fire a rocket and send a line with the wind, and so establish communication.

Rich Mineral Discoveries in Utah.

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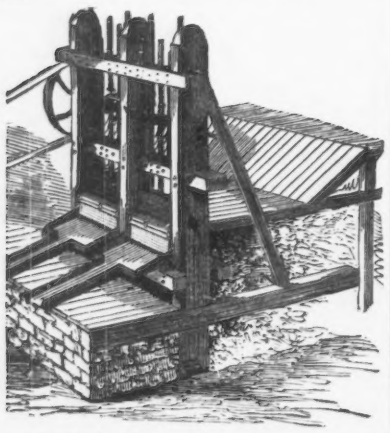

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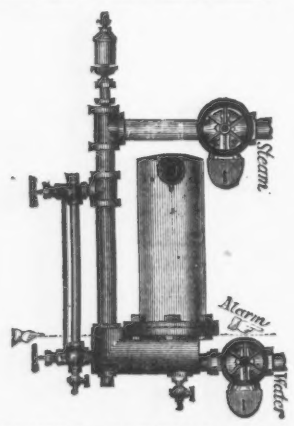

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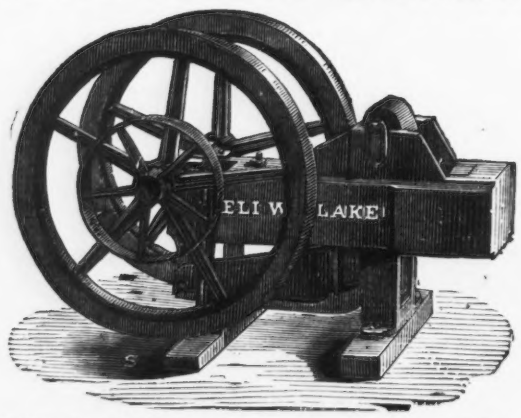

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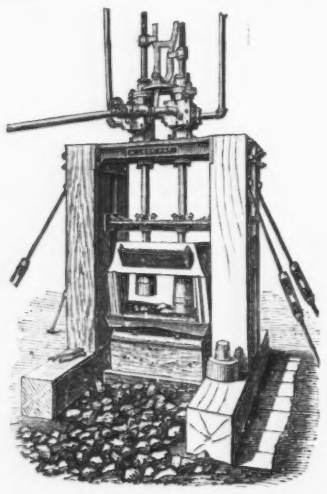

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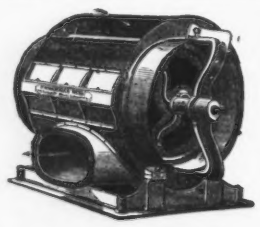

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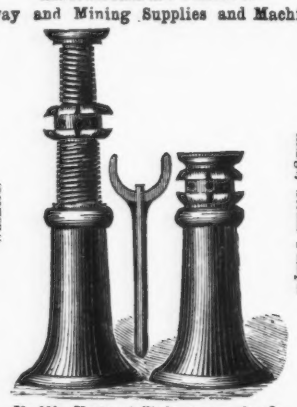

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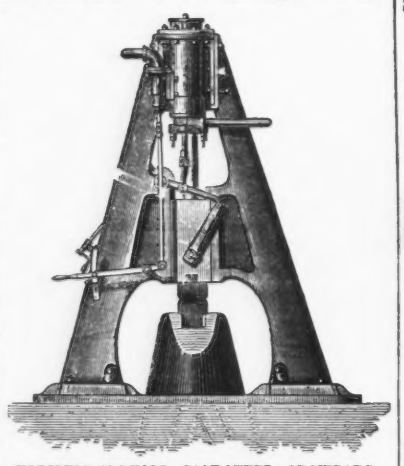

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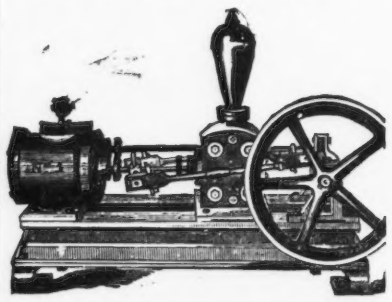

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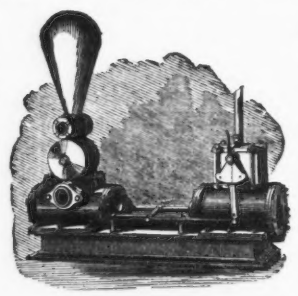

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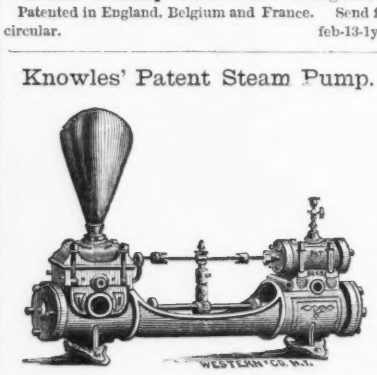

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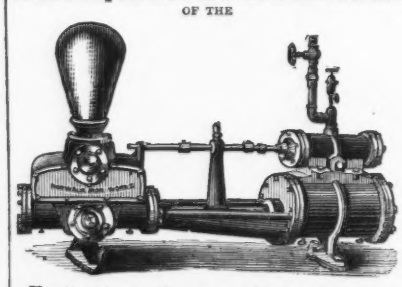

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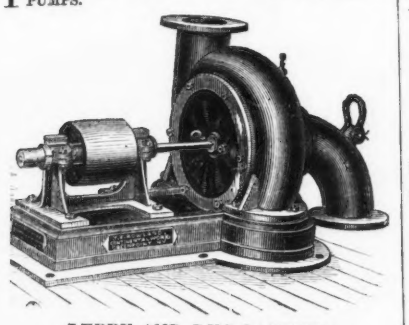

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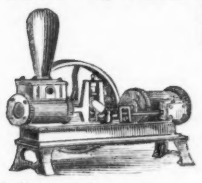

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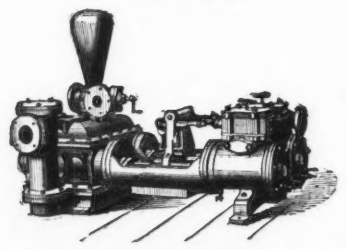

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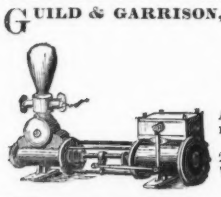

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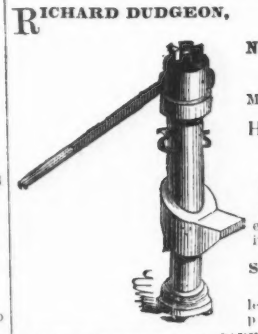

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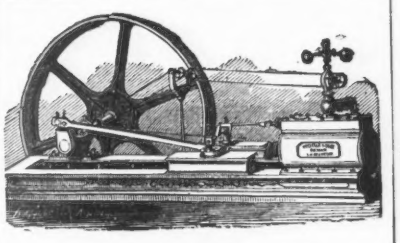

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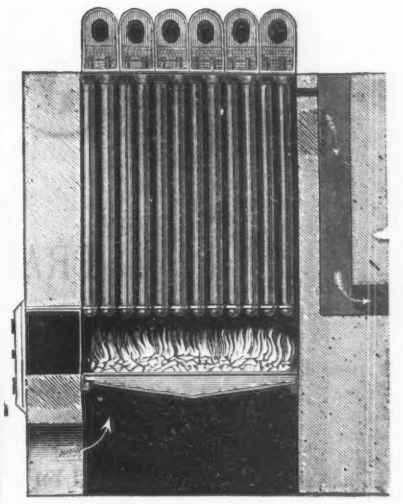

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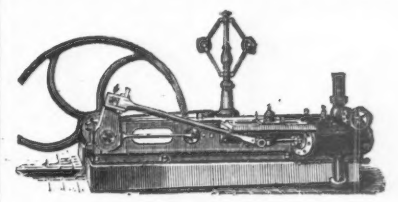

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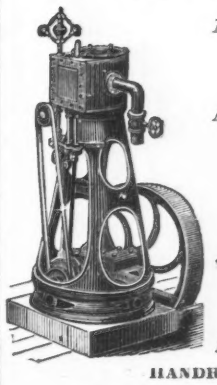

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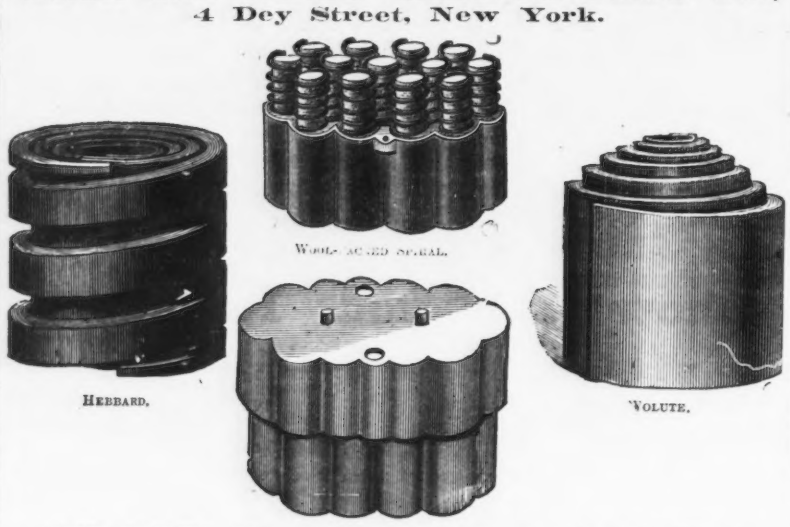

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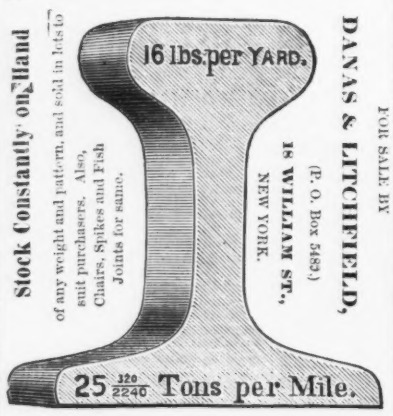
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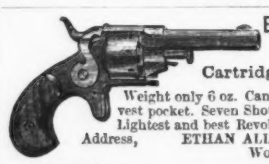

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